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The Public Lighting Tables of the American Meter Company will be found in the page advertisement of that Company.

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[NOTICE.]

The July Meeting of the Pacific Coast Gas Association.

PACIFIC COAST GAS ASSOCIATION,
OFFICE OF THE PRESIDENT,
SAN FRANCISCO, CAL., May 24, 1905.

To the Members of the Pacific Coast Gas Association:

Date of Meeting.—Attention is again called to the coming meeting of the Pacific Coast Gas Association, which will be held in this city, July 18th, 19th and 20th next, a little less than two months distant.

Question Box.—Mr. E. C. Jones has kindly consented to edit the Question Box for this year's meeting, and inquiries in connection therewith should be sent to him, his address being 628 Rialto Building, San Francisco. The Question Box is a department of the Association work which is of continually increasing importance, and Mr. Jones' editorship will insure success, especially so if the members will make free and unhesitating use of his valuable services.

New Members.—What have you done towards increasing the life and value of the Association by adding new members? Blanks have been furnished you for this purpose, and if you have not already sent a name or two to the Secretary it is earnestly hoped that you will soon do so, as you must certainly know of some eligible and desirable person whom we would like to welcome as an active member, or firm as an associate member.

Department Editors.—Do not overlook the fact that Mr. G. S. Colquhoun, of Fresno, is the "Wrinkle" Editor; Mr. R. P. Valentine, of Sacremento, is the "Experience" Editor; Mr. G. H. Hollidge, of Oakland, is the "Novelty" Editor; and Mr. Geo. P. Low, of San Francisco, is the Association Historian. All of these departments need your assistance.

Programme.—An excellent programme is being arranged and all members should now begin arrangements to be present.

Very sincerely and fraternally, L. P. LOWE, President.

[NOTICE.]

Question Box, Pacific Coast Gas Association.

PACIFIC COAST GAS ASSOCIATION,
OFFICE OF THE PRESIDENT,
623 RIALTO BUILDING,
SAN FRANCISCO, CAL., June 5, 1905.

To the Members of the Pacific Coast Gas Association: The Question Box has become an important part of the meetings of Eastern Gas Associations, and it has been found a most valuable means of conveying needed information on subjects directly relating or tangent to our business. It is desired that our Association shall have a creditable Question Box at the coming meeting, to be held in San Francisco, July 18, 19 and 20.

I have been honored by being appointed Editor of the Question Box, and I urge the hearty co-operation of every member of the Association to make it a success. The time is short and there is much work to be done.

Please send to me questions, the answers of which will be of help to you, and I will use every effort to have them properly answered by the members of our Association. Our Question Box will differ in some respects from those of other Associations, inasmuch as neither the name of the one who asks nor the one who answers the question will be made public, and no question will be answered by simply "Yes" or "No," but wherever possible, good reasons drawn from experience will will be given.

Please send at least one question *now*, and it will be appreciated by,

Yours faithfully, E. C. JONES, Editor.

SMITHSONIAN DEPOSIT

[Official Notice.]

Respecting the Official Work of the American Gas Light Association.

American Gas Light Association,
Secretary's Office,
530 Broadway, N. Y., Dec. 13, 1904.

To the Members American Gas Light Association: As there seems to be some misunderstanding respecting the standing of the official management of the Association, members will please note that the undersigned is the Secretary of the Association, and that Mr. A. E. Forstall is carrying forward the work of the Practical Class. All correspondence in connection with the Practical Class should therefore be addressed to Mr. A. E. Forstall, 58 William street, and all other matter pertaining to the Association to Mr. George G. Ramsdell, Secretary, at the above address.

[Notice.]

Wrinkle Department, Ohio Gas Light Association.

Ohio Gas Light Association,
Office of the Wrinkle Dept.,
719 Citizens Building,
Cleveland, O., June 13, 1905.

The Wrinkle Department of the Ohio Gas Light Association is now ready to receive contributions for the 1906 collection, and a sketch or description of all devices, formulæ and methods of accomplishing objects pertaining to the gas business, is respectfully solicited.

Please send a written explanation, accompanied by any sketch, photograph or drawing, to the above address, or a description alone will suffice.

Hoping to receive prompt compliance, Yours very truly,
W. E. Steinwedell, Editor.

BRIEFLY TOLD.

Obituary Note, John H. Tuffs.—With exceeding regret we herewith report the death of Mr. John H. Tuffs, whose demise occurred at an early hour of Sunday, the 18th inst., at his home in Syracuse, N. Y. He was stricken with apoplexy the day before, and the violence of the shock may well be imagined from the short time he survived the attack. Deceased, who was in his 53d year, first came to Syracuse from Clyde, N. Y., at the invitation of Mr. Austin C. Wood, then Superintendent of the Syracuse Gas Light Company, who employed Mr. Tuffs as a fireman; if we mistake not, that connection was made in the fall of 1872. Naturally bright and observing, deceased gradually improved his position, and for some time prior to the taking over of the Syracuse Gas Light Company by its present owner, the Syracuse Lighting Company, he filled, and worthily so the responsible position of Superintendent of Works. The Syracuse Lighting Company continued him as Superintendent of the gas division of its enterprises. Mr. Tuffs was of an inventive turn of mind, and two of his inventions, in connection with bench firing, have met with marked favor. He is survived by his widow and one sister. The funeral services were held at his home in Syracuse the evening of the 20th inst., and the remains were subsequently removed to Clyde for interment. For many of the particulars here given we are indebted to the courtesy of Mr. Frederick W. Floyd.

Notes—

The Third Annual General Meeting of the Institution of Gas Engineers was most successfully brought off in the handsome and commodious assembly rooms of the Institution of Mechanical Engineers, London, May 30 and 31 and June 1, under the presidential direction of Mr. D. Irving, Chief Engineer of the Bristol Gas Company. The meetings were in every sense a success from a technical standpoint, and the social doings were of the heartiest nature. The lecture, which was by Professor Arthur Smithells, Bs.C., F.R.S., of the Leeds University, was on the subject of "The Temperature of Flames." His treatment of his theme was a convincing combination of theory and practice. A feature of the meeting was the heartiness of the reception tendered to Mr. George G. Ramsdell, Secretary of the American Gas Light Association, and Mr. Ernest C. Brown, of New York city. The Birmingham medal was awarded to Mr. James W. Helps.

Mr. Stewart Wilder, in addition to serving the corporation as Vice-President, will also act as General Manager of the Northern Westchester Lighting Company. His headquarters will be in Ossining-on-the Hudson.

Mr. W. A. Wood has been formally appointed Chief Engineer to and Assistant General Manager of the Bosten Consolidated Gas Company.

[Official Report.—Revised by the Secretary.—Continued from Page 969.]

TWENTY-EIGHTH ANNUAL MEETING, WESTERN GAS ASSOCIATION.

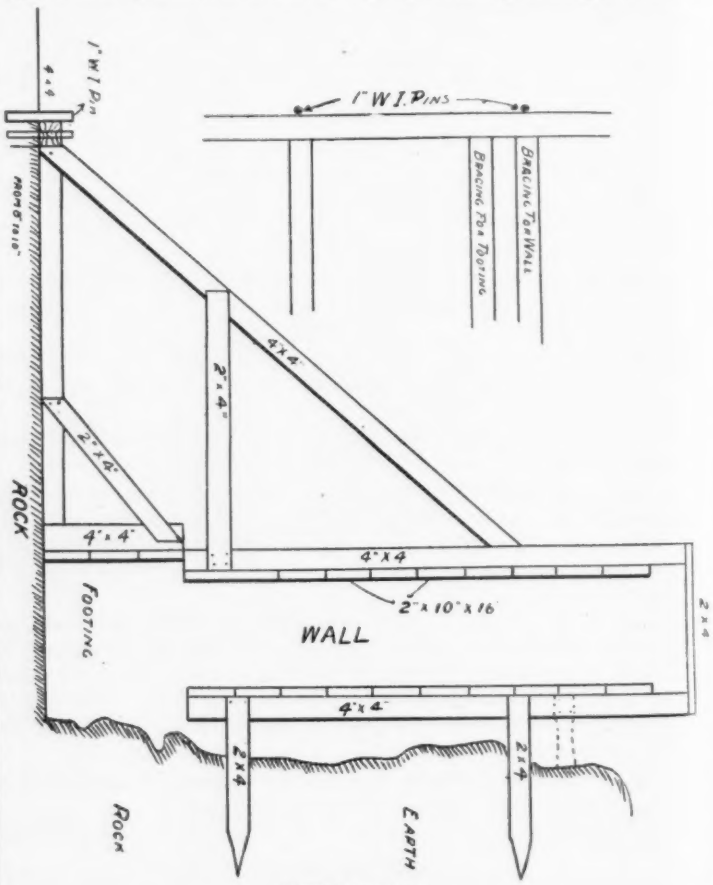
Held at Chicago, Ills., in the Auditorium Hotel, May 17, 18 and 19.

First Day—Afternoon Session.

BUDGET FROM THE WRINKLE DEPARTMENT.—*Continued from Page 969.*

General Construction.

No. 1.—"*Method of Holding Wooden Forms for Concrete on Rock.*—When erecting a concrete foundation on a bed of rock, where it is necessary to have one end of the board trench on the surface of the rock, we use a very simple method that prevents any part of the trench from giving way, bulging or sliding. The drawing shows this method. The footing is first put in and allowed to set, after which the trench for the wall is eected as shown. One side of the trench is braced by driving a 2-inch by 4-inch into the earth, and securely nailing it to the 4-



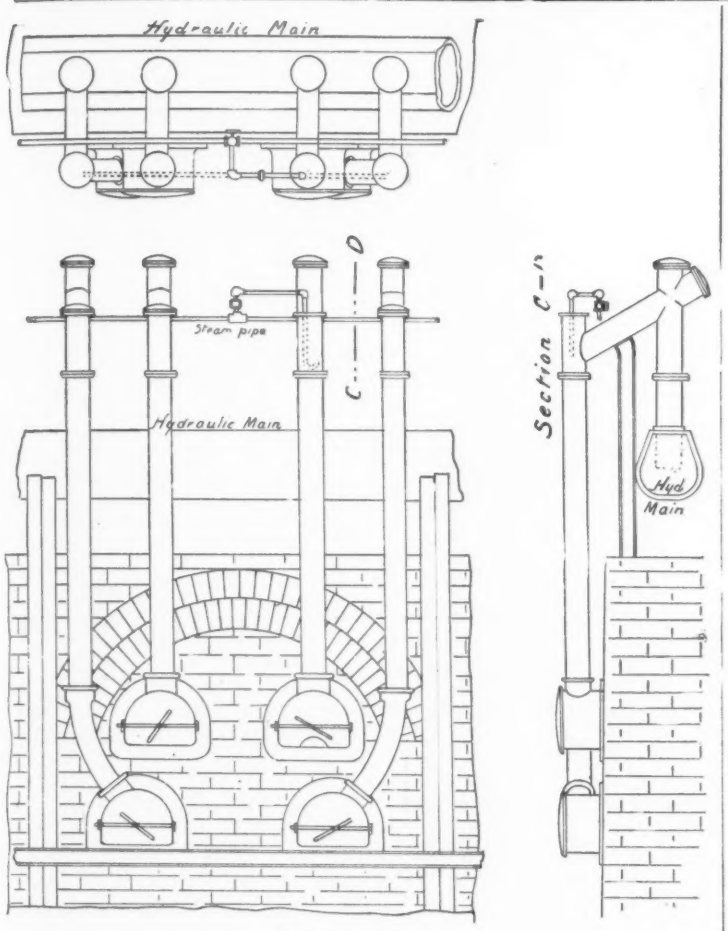
Wrinkle No. 1.

inch by 4-inch upright bracing. This will do very well where the bank is of a soft material, but when it is rock we have a short 2 inch by 4-inch of whatever length is required, between the upright 4-inch by 4-inch and the rock, as shown in dotted lines on drawing. The bracing on the two sides of the trench, together with the 2-inch by 4-inch nailed across the top of the uprights, securely joins the entire trench, and there is no possible way for it to bulge. All parts are properly nailed." R. E. Hagenah, Laclede Gas Light Company, St. Louis, Mo.

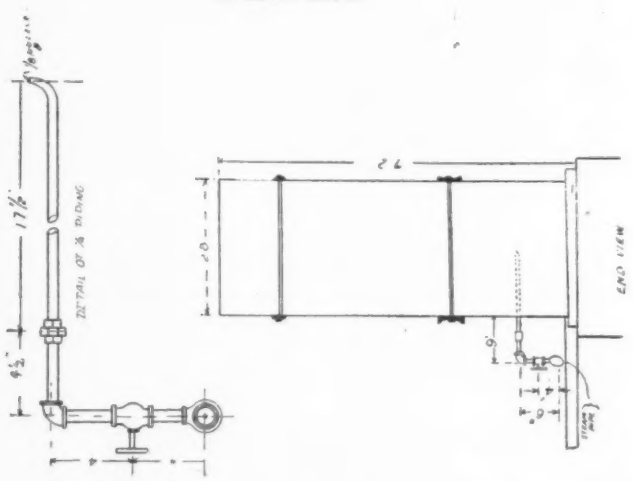
No. 2.—"*Method of Obtaining a Smooth Surface on Concrete Work.*—To get a smooth concrete surface, particularly on the inside of a concrete arch where it is difficult to keep macadam from showing, we cover the board arch with building paper, and put on the first layer of concrete about 2 inches thick. This layer has but very little macadam, the mixture being about 2-4-1, or 2-3-1. After the boards and paper have been removed the surface is very smooth and nice appearing. The remainder of the arch is finished with the usual mixture of 5-4-1, or 5-3-1."—R. E. Hagenah, St. Louis, Mo.

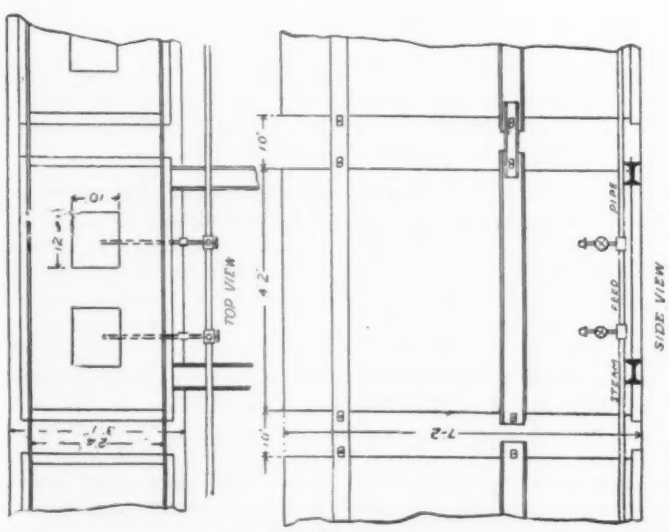
General Construction.—Coal Gas.

No. 1.—"*Device for Burning Out Standpipes and Scurfing Retorts.*—The accompanying sketch illustrates a method of burning out standpipes and scurfing retorts in use at Station B, Laclede Gas Light Com-



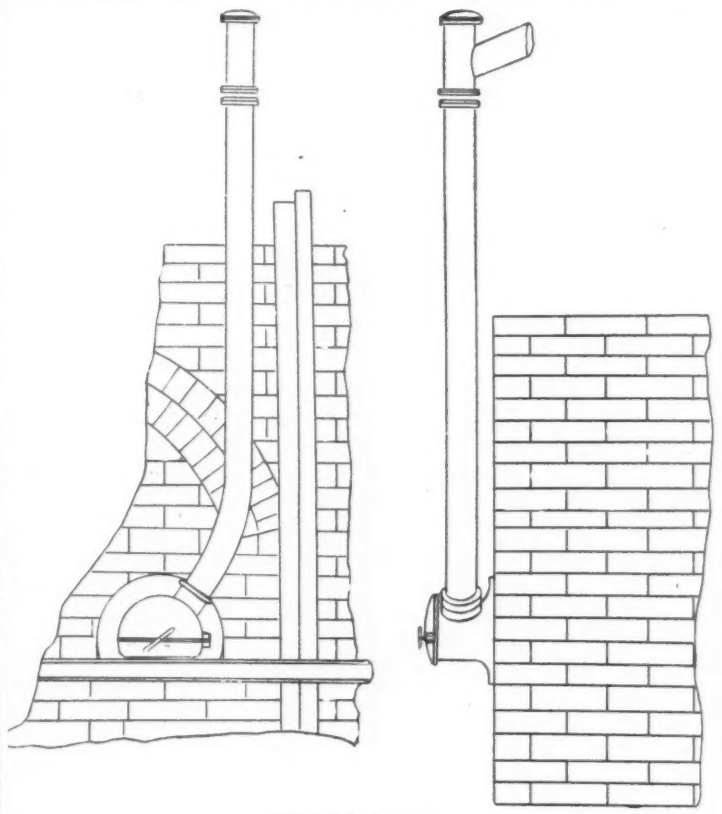
Wrinkle No. 1.



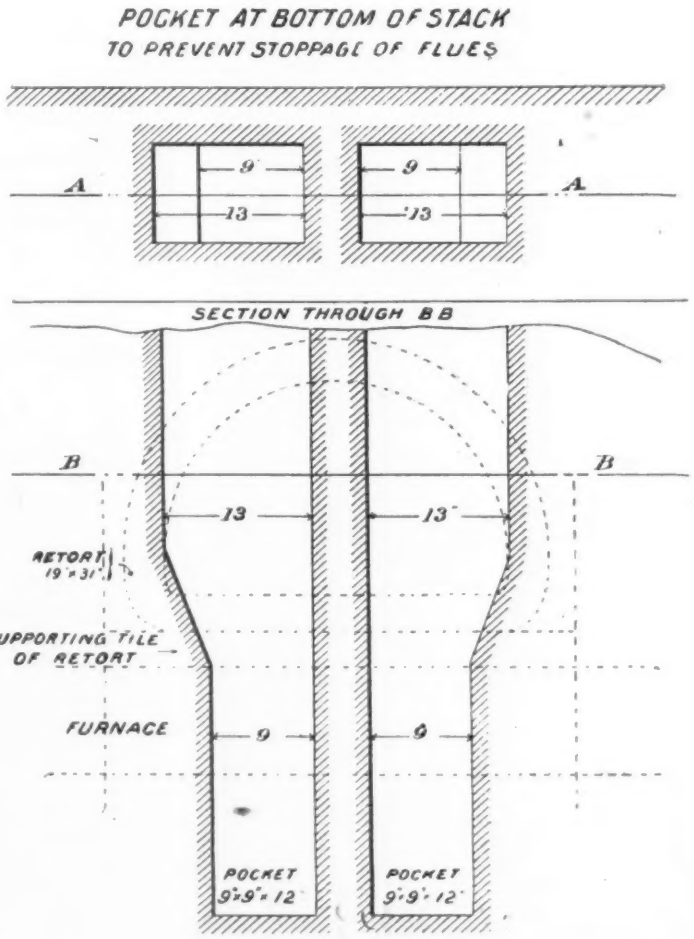


Wrinkle No. 2

pany, which consists of a permanent steam line, with valve and union, at center of each bench. Short lengths of pipe and goosenecks are attached as shown, the regular carbon tile being placed in the retort as usual to within 10 inches of rear and the steam then turned on. We have scurfed retorts in 7 hours by this method, but care must be exercised in regulating the supply of steam or the standpipes will become too



Wrinkle No. 3.



Wrinkle No. 4.

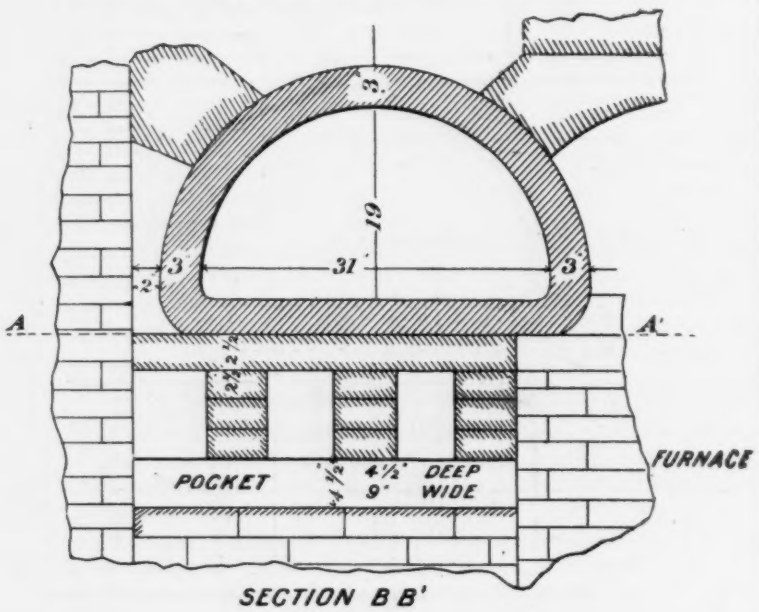
hot. The jet can also be introduced into bottom of standpipe."—D. G. FISHER, Laclede Gas Light Company, St. Louis.

No. 2.—"*Method for Creating Forced Draft in Stacks by Means of Steam Jet.*—The sketch shows this method very clearly. A steam feed pipe is run along the top of the stack, or at some other convenient place. From this feed pipe a small pipe, with valve and nozzle, runs into the stack. By means of the valve the draft can be regulated and a strong or light draft be created at will."—D. G. FISHER, Laclede Gas Light Company, St. Louis, Mo.

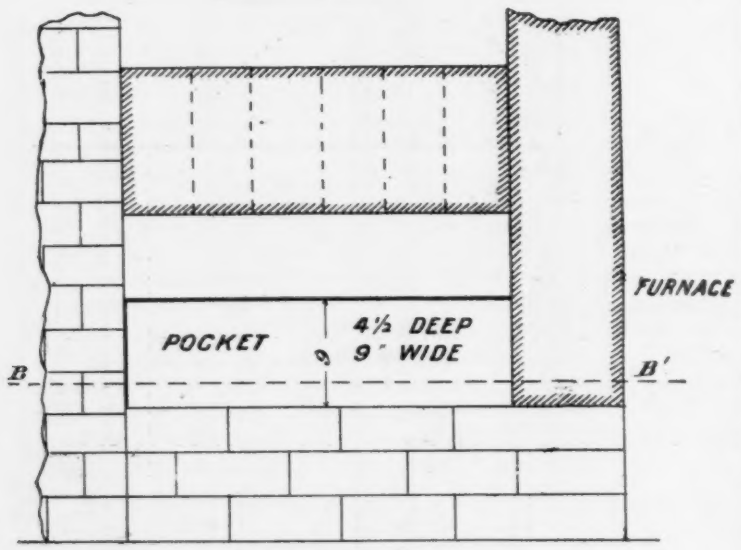
No. 3.—"*Wrought Iron Standpipe for Bottom Retort.*—The wrought iron standpipe seems to collect less carbon and tar than a cast iron pipe and does away with the joint just above the mouthpiece. At station "B," Laclede Gas Light Company, we have for the past year used an asbestos ring joint with a yellow clay lute at the mouthpiece very successfully. This joint is much more easily made than the borings-joint, and allows the pipe to expand, which is especially necessary when scurfing. Care must be taken that the base of the pipe does not rest against the mouthpiece."—D. G. FISHER, Laclede Gas Light Company, St. Louis, Mo.

No. 4.—"*Pocket at Bottom of Stack to Prevent Stoppage of Flues.*—From the sketch it will be seen tthat the pocket at the base of the vertical flue prevents any stoppage in the horizontal flue, due to carbon, dirt and slag that accumulate in the stack, and, if made large enough, will not become filled during the life of the bench."—D. G. FISHER, Laclede Gas Light Company, St. Louis.

No. 5.—*Increasing Drafts Under and Around Retorts.*—At Station "B" the Laclede Gas Light Company, after having tried everything else, brought up benches that were down by simply removing two layers of brick in the front of the bench as shown in attached sketch. The benches are direct fired. The pocket at the front of the bench seems to increase the draft under and around the retorts."—D. G. FISHER, Laclede Gas Light Company, St. Louis.



SECTION B B'



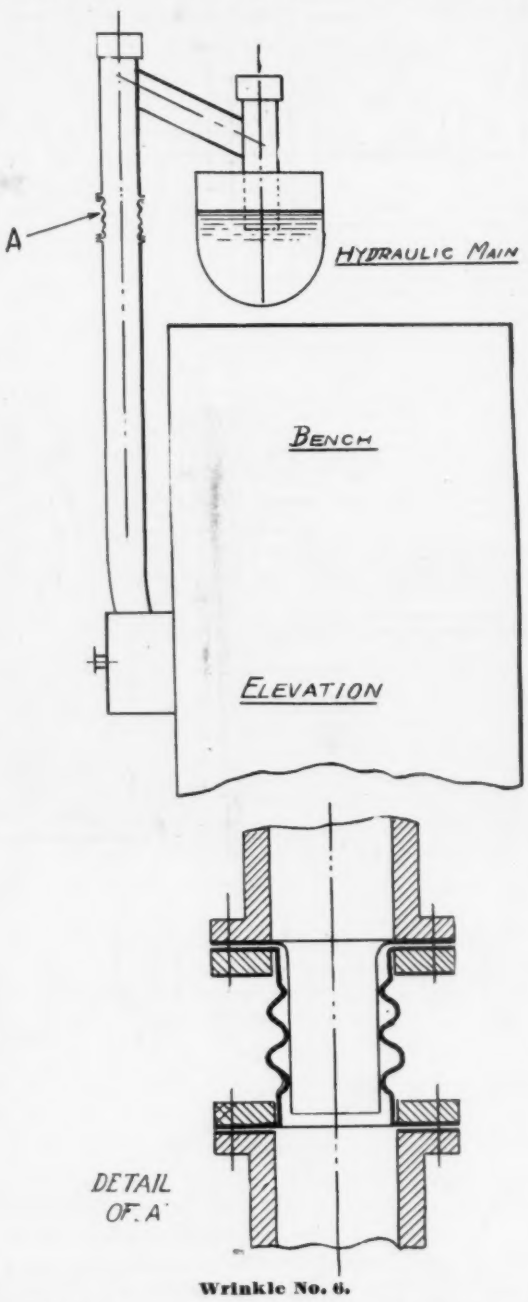
SECTION A A

POCKET TO INCREASE DRAFT UNDER RETORTS.

STA. B. SCALE 1"=10"

Wrinkle No. 5.

No. 6.—"*Method for Allowing Standpipes to Contract and Expand.*—*A* is a corrugated insertion in the standpipe, made of light steel, and held in place by flanges. The straight piece is a protecting cover for the corrugations, so that the tools used for cleaning will not punch holes in the expanding piece."—GEO. S HESSENBRUCH, Laclede Gas Light Company, St. Louis.



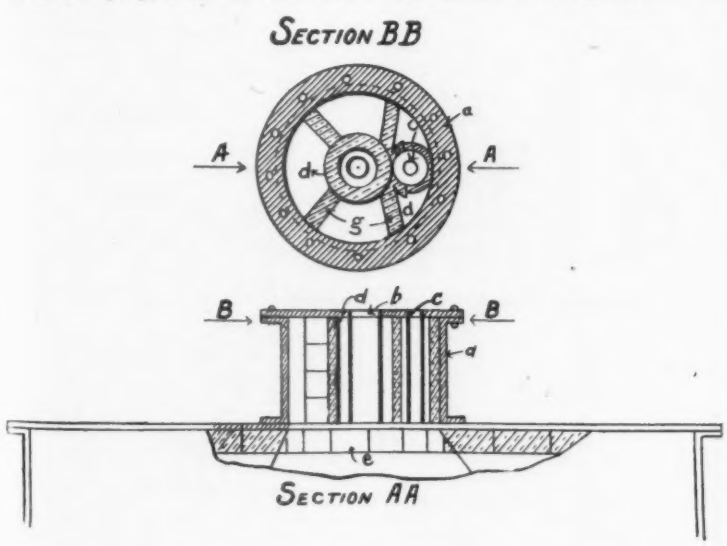
Wrinkle No. 6.

No. 7.—"*New Coke Conveying Apparatus.*—The photograph speaks for itself. Four mules are used; two working during the day the other two at night. On first training them to work in the retort house each mule had a driver, but after a few weeks they were able to go in and out by themselves. The 4 mules have displaced 8 men in the winter months. These men are at the rate of $2 per shift, making a saving of $16 per 24 hours. In the 7 summer months we paid these men $2.15, making a saving of $17.20 per 24 hours. The mules weigh about 1,000 pounds each, and the cost of their keep is about $1 per day for the four. The mules working in the retort house have had a very quieting effect on all the rest of the labor, and for that reason I would keep them if they were no saving at all. Some of our men have called them the 'New coke conveying apparatus.'"—CHAS. S. BEARDSLEE, Cleveland (O.) Gas Light and Coke Company.

Wrinkle No. 7.

GENERAL CONSTRUCTION.—WATER GAS.

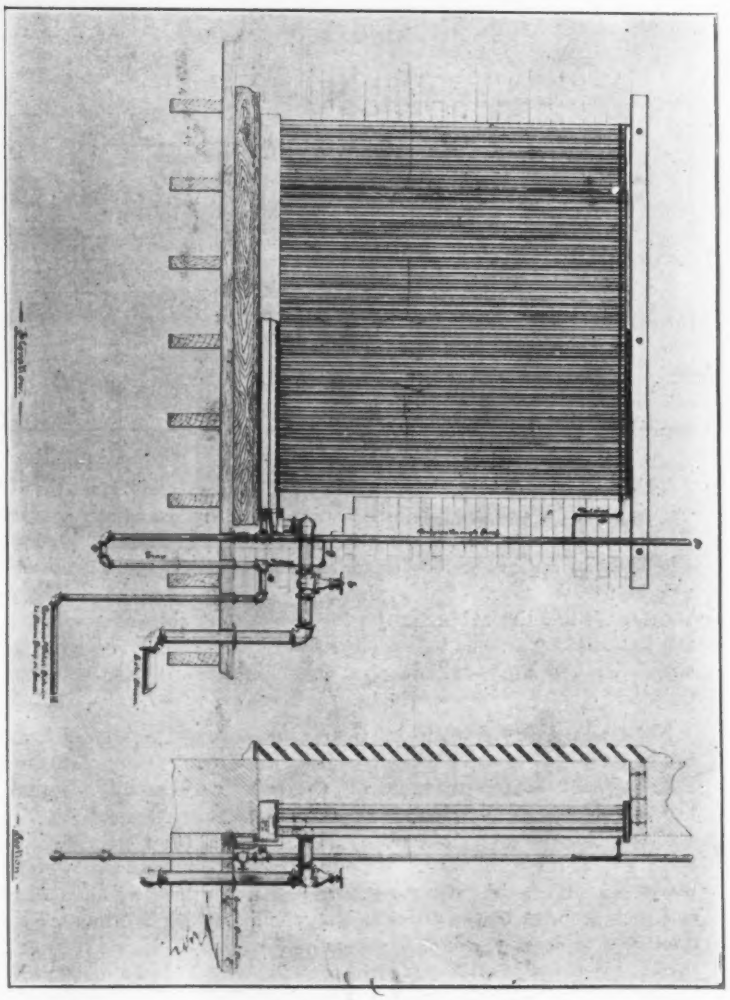
No. 1.—"*Emergency Lining for Neck of Carburetter.*—On account of the negligence of a workman it became necessary to place the tile in the neck of the carburetter of a water gas machine for the installation of an oil spray, after the coke fire had been started in the generator. A workman started to do the job, but in a very short time was overcome with gases coming from the generator. The problem was then to construct something that would answer the purpose and which could be placed in the shortest possible time, to prevent others from getting too much gas. Our method of doing this is shown in the accompanying drawing, in which *A* is the neck of carburetter; *B*, opening for spray; *C*, peep-hole; *D*, scurfing tile; *E*, tile in bottom of neck; *G*, 9-inch square firebrick, cut off to fit and to hold scurfing tile in position. The brick and tile were cemented with the usual mixture of fireclay, asbestos, cement and water. After all the material was at hand it took a trifle over 4 minutes to complete the job."—R. E. HAGENAH, Laclede Gas Light Co., St. Louis.



EMERGENCY LINING FOR NECK OF CAR BURETTER

Wrinkle No. 1.

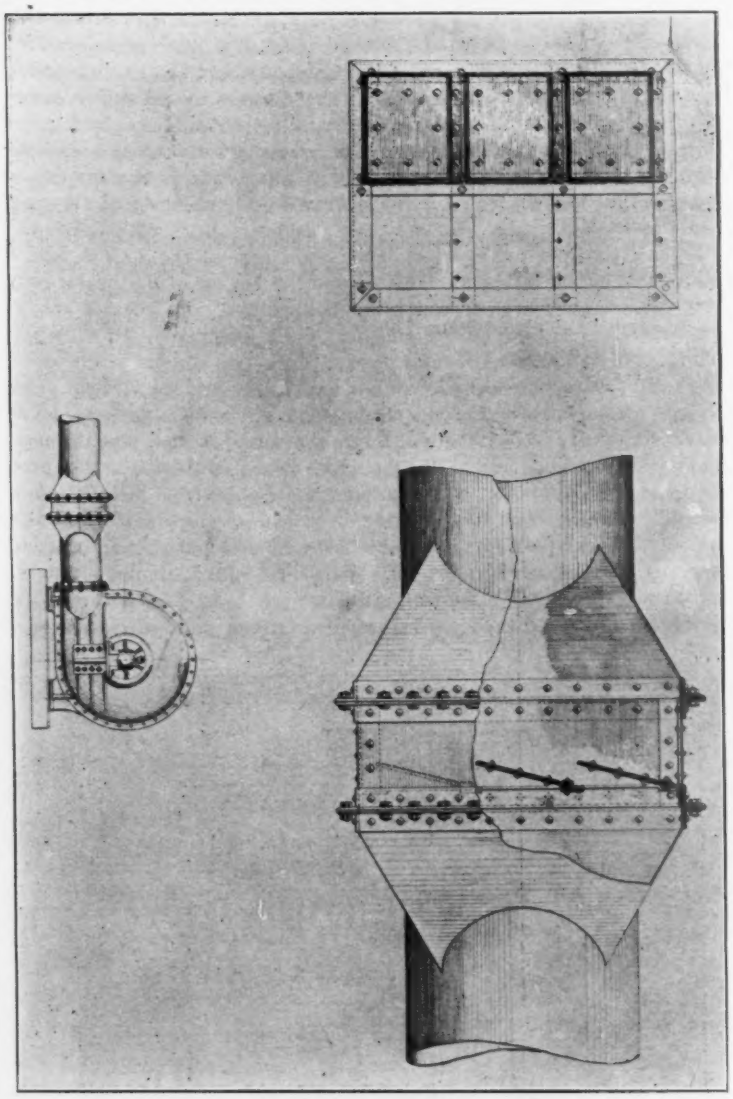
No. 2.—"*Apparatus for Preheating Air for Blowers for Water Gas Sets.*—The drawing shows the method adopted at the various stations of the Peoples Gas Light and Coke Company, of Chicago, to provide the large volumes of air required by the blowers in the engine room for the generators. This arrangement insures air at atmospheric pressure at the blower inlets, obviates the necessity for opening windows and doors, and, during extreme cold weather, warms the air on its passage into the engine room. The drawing shows the pipe arrangement in both side and end elevation. In the side elevation *A* is the supply pipe from the main exhaust steam pipe of the station, and is controlled by the valve *E*. The top and the bottom of the heater consist of two hollow steel boxes, the bottom and top sides of which respectively form flue sheets and are joined together by 1-inch pipes. The length and number of these pipes depend upon the size of the opening. The steam enters the lower box and passes into the vertical pipes where it condenses and drains back. The water from the condensed steam flows out through the seal *D* into the sewer. A vent pipe through the roof is provided, and to this the upper box is connected by the pipe *G*, to insure circulation and to prevent the system from becoming air bound. A connection is also made, by means of the pipe *F*, from the top of the seal pipe to the vent to prevent siphoning. The outside opening of this air vent in the wall is provided with stationary shutters, as shown. If a very large volume of air has to be drawn through a given opening, or if the temperature is not raised sufficiently, a second



Wrinkle No. 2.

heater or row of pipes may be installed behind the first."—J. H. EUSTACE, Peoples Gas Light and Coke Company, Chicago, Ills.

No. 3.—"*Automatic Check-Valve for Blast-Piping.*—The sketch shows the automatic check valves adopted at the several stations of The Peoples Gas Light and Coke Company of Chicago, to prevent damage to our blowers from any explosions which may occur in the blast pipes. These also control the flow of air from the blowers, prevent the air from the blast-pipe backing out through a blower which is not running, and generally take the place of the old-style blast gate. The device is an arrangement of check valves. The seats of the valves consist of a steel plate set in the blast pipe at right angles to the flow of the air and provided with a number of openings. The checks are made up of



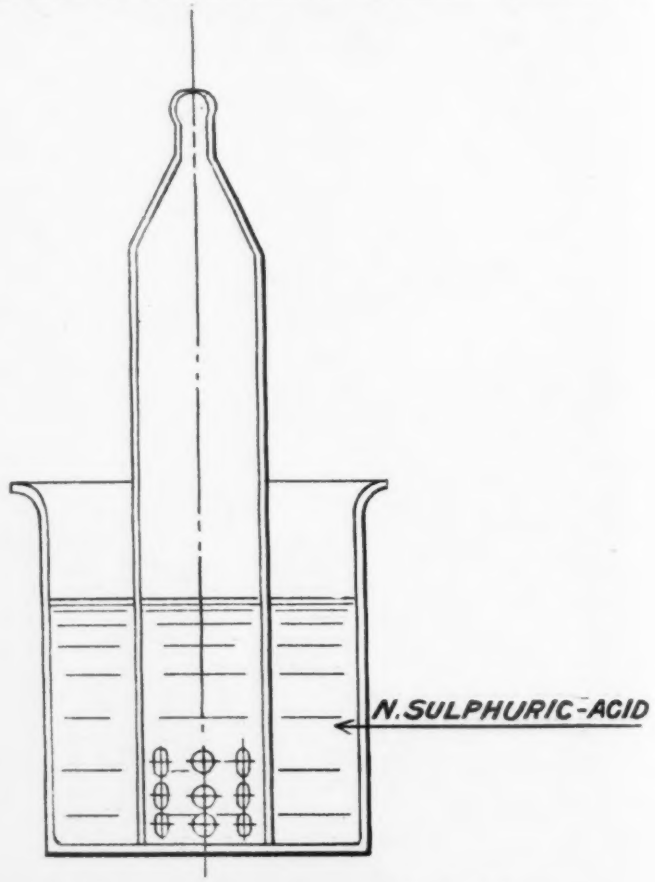
Wrinkle No. 3.

⅛ inch cloth insertions rubber packing ¾ inch larger on 3 sides than the opening. On the fourth side the rubber is 2 inches longer, and this longer projection is bolted to the stationary plate and serves as a hinge. The body of the rubber is shod on both sides with metal plates which are bolted together. These plates give the necessary weight and strength, while the rubber projecting around the sides serves to make the joint tight when the valves close from back pressure from the front side."—J. H. EUSTACE, Peoples Gas Light and Coke Company, Chicago.

No. 4.—"*Lining for Lid of Generator Door.*—The intense heat in the generator of a water gas set causes the wrought iron plate on the under side of the generator lid to deteriorate very rapidly, so that it becomes necessary to replace it by a new one quite frequently. These wrought iron plates do not always keep the lid from getting red, not even when they are new. We did away with these wrought iron plates in most of our water gas generators, and instead we have a layer of ¾-inch firebrick on the under side of the lid, which is cemented with a mixture of fireclay, asbestos, cement and water. It is safe to say that this lining, if put in with care, will remain as long as any other part of the generator."—R. E. HAGENAH, Laclede Gas Light Company, St. Louis.

CHEMICAL.

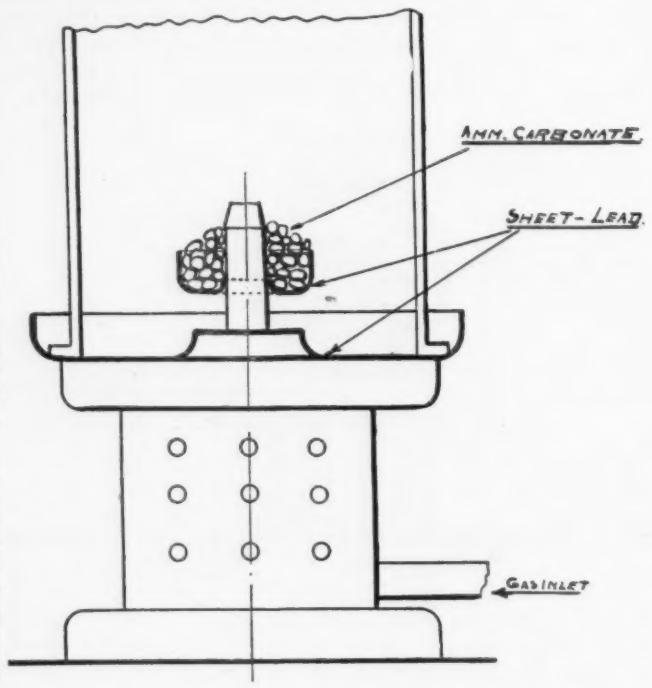
No. 1.—"*Ammonia Determination Apparatus.*—At the beginning of an ammonia determination, unless one is careful, the air confined in the apparatus escapes rapidly in large bubbles. This gives a chance, although small, for ammonia to escape. To eliminate this chance of



AMMONIA-DETERMINATION-APPARATUS.

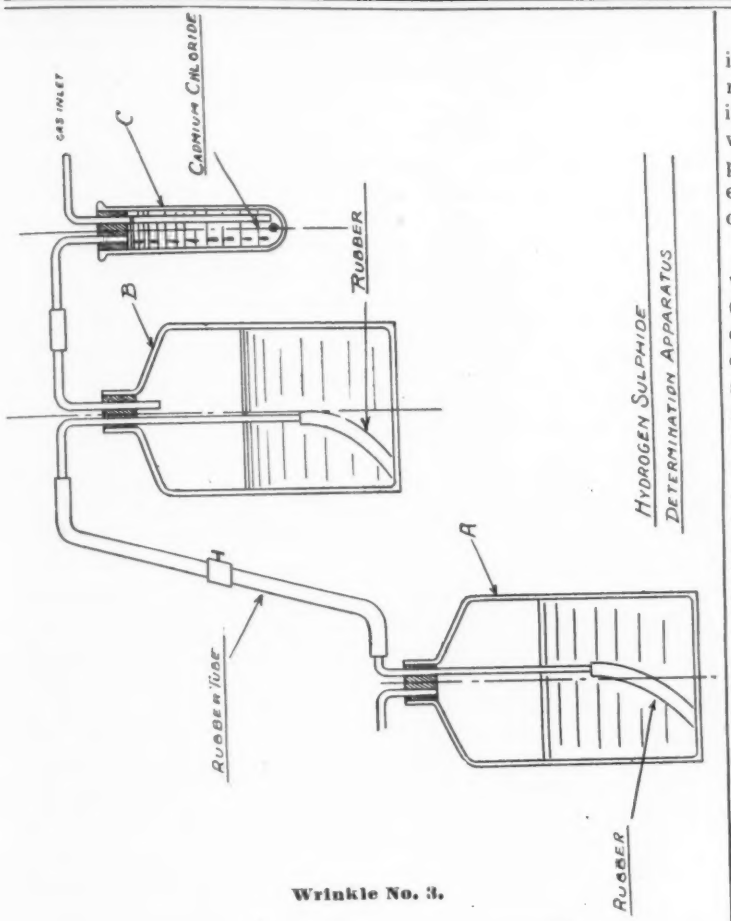
Wrinkle No. 1.

error several small holes are bored in the condensing tube, about ¾ inch from the bottom. These allow the air to escape in small bubbles, and insure an intimate contact with the acid (see sketch.")—D. WILSON, Laclede Gas Light Company, St. Louis.



MODIFICATION OF REFEREES SULPHUR-APPARATUS

Wrinkle No. 2.

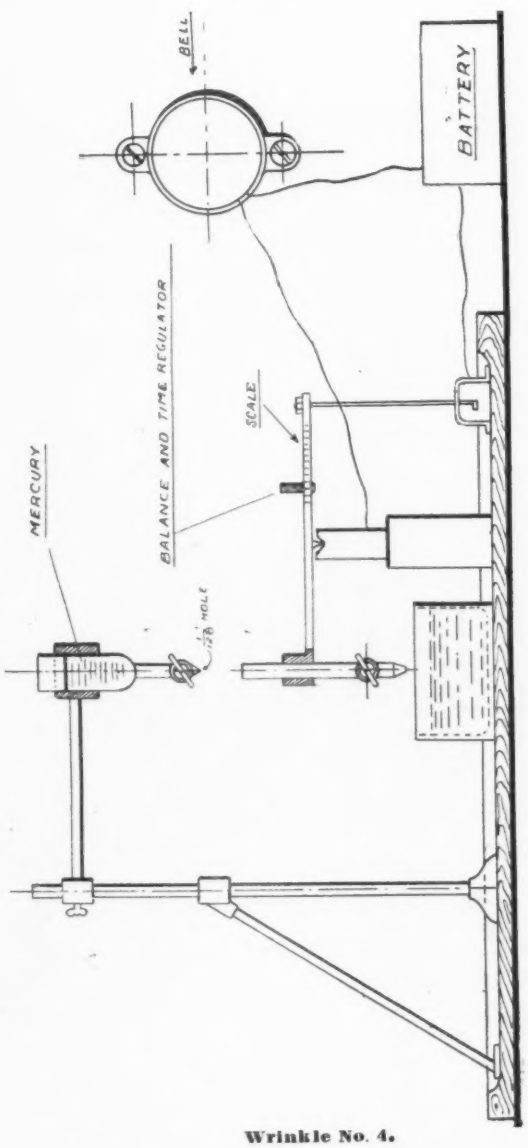


Wrinkle No. 3.

No. 2.—"*Referee Sulphur Apparatus.*—When the flame burns low in a referee apparatus there is a loss of sulphur caused by some of the moisture condensing and running down the side of the trumpet tube into the burner. This water also dissolves the ammonium carbonate, which in turn corrodes the burner rapidly. To eliminate these bad points we made additions to the burner as shown on drawing. At the end of the test the lower dish is washed into the vessel containing the other washings."—D. WILSON, Laclede Gas Light Company, St. Louis.

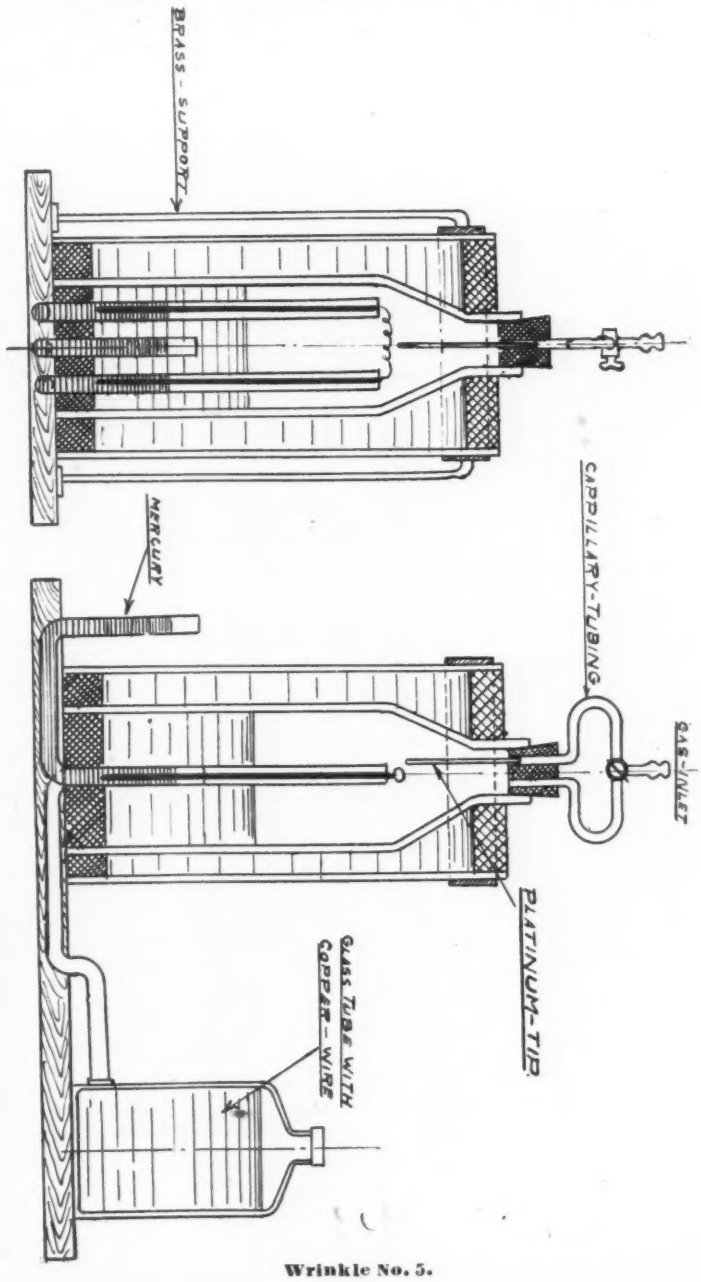
No. 3.—"*Determination of Hydrogen Sulphide.*—On the sketch it will be seen that *A* and *B* are common glass bottles, of known capacity (about 5 pints) arranged to siphon into each other. *C* is an 8 inch wash cylinder, partly filled with alkaline (ammonia) solution of cadmium chloride. The inlet tube of the wash cylinder is attached to the gas supply and the siphon started. After starting the apparatus requires no attention, for as soon as the upper bottle is emptied the pressure of the water in the lower one stops the flow of gas. The volume of gas passed is that of the upper bottle. The hydrogen sulphide, which has been precipitated as cadium sulphide, is determined by the usual method, *e. g.*, dissolve the cadmium sulphide in cold dilute hydrochloride acid and titrate with iodine, using starch as an indicator. By means of a pinch-cock on the siphon tube the test can be made to cover any length of time."—B. C. KEISER, Laclede Gas Light Company, St. Louis.

No. 4.—*An Automatic Timer for Gas Analysis.*—The time factor often occurs in making a gas analysis, *e. g.*, the gas has to be treated with the reagents for certain lengths of time to insure complete extraction, and the measuring burette should not be read before the water has run down the sides, or an error of several tenths per cent. will be made. The apparatus shown in sketch can be set for any number of

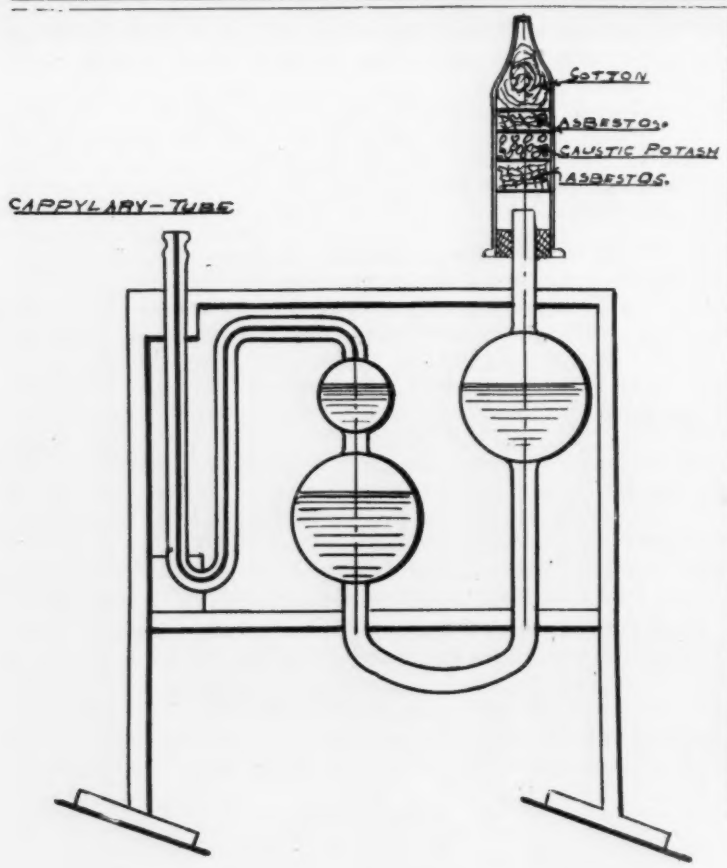


Wrinkle No. 4.

AUTOMATIC TIMER FOR GAS ANALYSIS.



Wrinkle No. 5.



FUME-EXTRACTOR.

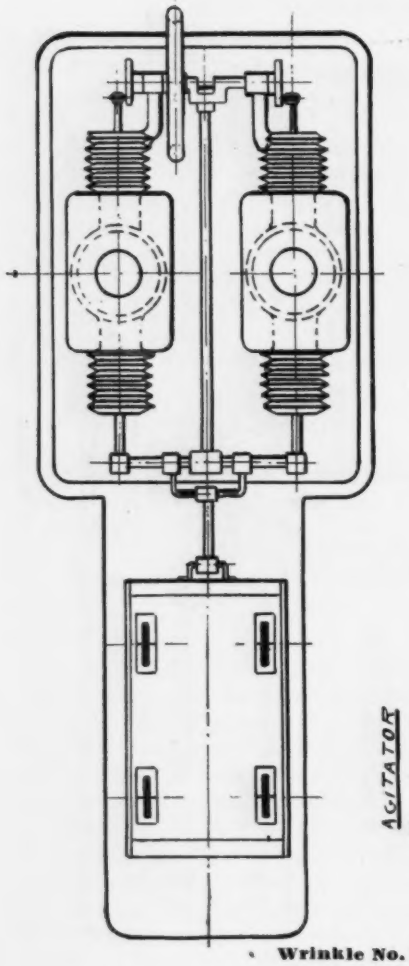
Wrinkle No. 6.

minutes by shifting the rider, at the end of which time it sounds an alarm. This apparatus need not be limited to gas analysis, but can be used for other purposes."—H. A. ROESLER, Laclede Gas Light Company, St. Louis.

No. 5.—"*A Combustion Pipette.*—The ordinary method of determining the hydrogen and methane in a gas mixture is by exploding a small portion of the mixture with air or oxygen. A better way is to burn all the mixture in a slow combustion apparatus. (See method of Dennis and Hopkins in 'Hempel's Gas Analysis,' p 293). The changes we have made are: (1) The addition of a water jacket to lessen the danger of cracking; (2) the platinum jet next the platinum wire to insure the ignition of the incoming gas; (3) the introduction of the gas into the oxygen, which does away with the danger of explosion that there is when the reverse method is used. The drawing explains itself."—H. A. ROESLER and D. WILSON, Laclede Gas Light Company, St. Louis.

No. 6.—"*Fume Arrester for Sulphuric Acid Pipette.*—The attachment, as shown on drawing, is filled with alternate layers of stick potash and asbestos."—H. A. ROESLER, Laclede Gas Light Company, St. Louis.

No. 7.—"*An Agitator.*—When analyzing a gas with Hempel's apparatus, it is necessary to shake some of the pipettes for several minutes. This is a tiresome operation when done by hand, so we have made the shaking apparatus as shown in sketch. A small wagon was built in which the pipettes to be shaken are set. This wagon is attached by a suitable arrangement to the piston rods of the hot air motor. When the motor is running the wagon is moved backward and forward in this manner, shaking up the fluids in the pipettes. The hot air motor and the small wagon are mounted on a board so as to bring them on



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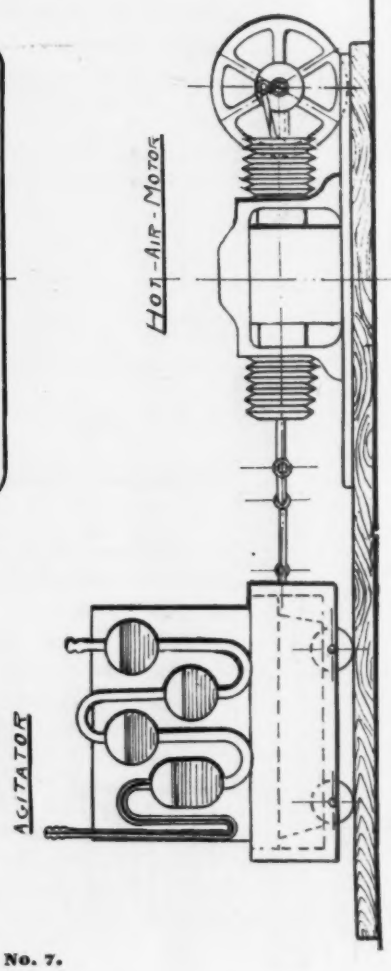
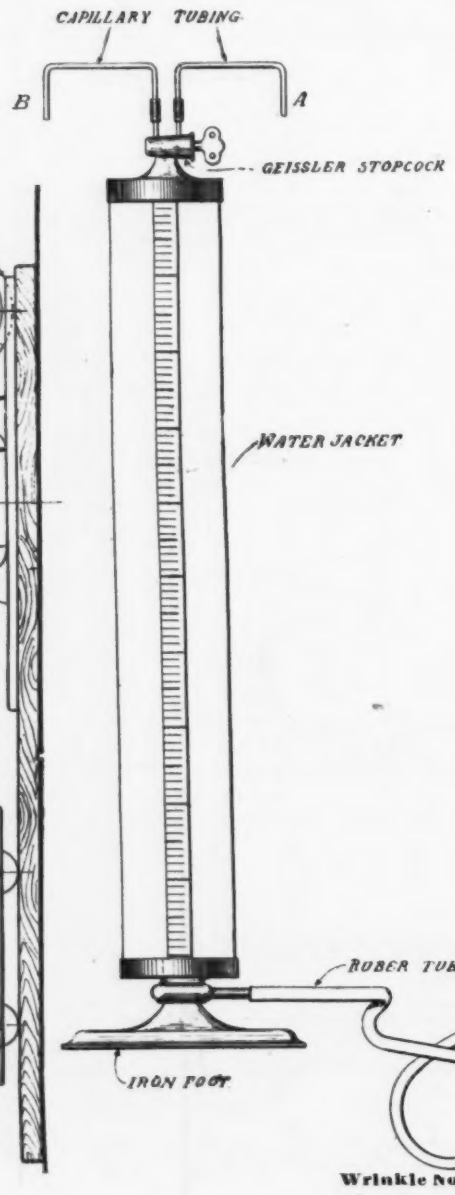




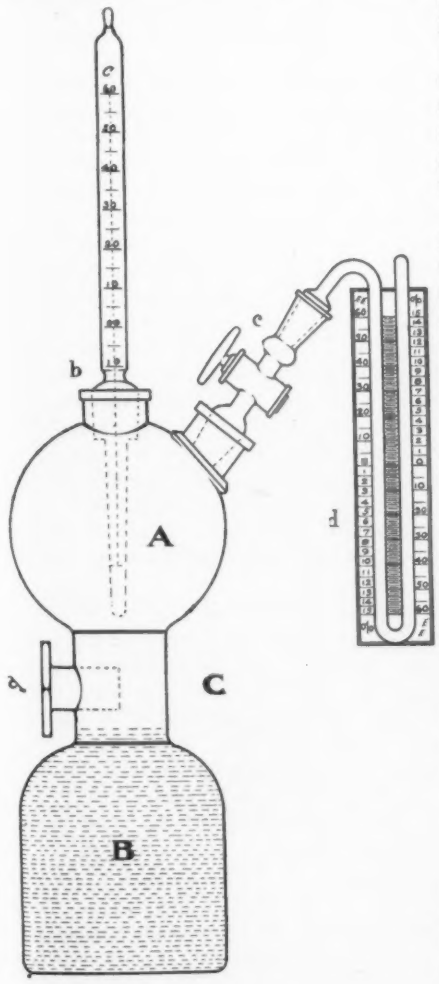
Wrinkle No. 8.

the same level. This is not a labor agitator, but has the reverse effect."—H. A. ROESLER and D. WILSON, Laclede Gas Light Company, St. Louis.

No. 8.—"*A Handy Burette for Use with Hempel's Apparatus.*—This burette is fitted with a Geissler 3-way cock. At the beginning of a test the burette and capillary connection tubes are filled with water; 100 cc. of gas is drawn through capillary tube *A* and the first pipette connected to *B*. The gas is now driven over into the pipette, both capillaries filled with water and the second pipette connected to *A*. After the gas has been drawn back and measured, it is put into the second pipette and then the first reagent is pushed out of the capillary into its pipette, thus leaving the capillaries full of water, etc."—H. A. ROESLER, Laclede Gas Light Company, St. Louis.

No. 9.—"*Method of Extracting Sulphur Out of Purifying Material.*—Until now hydrocarbons with a boiling point below 100° C. and coal tar oils with a boiling point above 100° C have been used to extract the sulphur out of the gas purifying material. To avoid the drawbacks of the above mentioned methods, there is a method of using coal oils with a boiling point of above 150° C. In this method of extraction the dissolving process takes place simultaneously with the melting of the S, which is very advantageous to the extraction. The extracted sulphur is free from any annoying compounds, and therefore shows its natural yellow color. Any traces of impurities can be easily removed by distillation. The material from which the sulphur is to be extracted and the coal oil are put together into a vat and heated to the boiling temperature of the dissolving element. This solution after boiling is drawn off into a second vat in which it is allowed to cool. The S deposits in a solid form and is separated from the dissolving medium by filtration. Any of the dissolving agents that may still remain in the extracted sulphur is extracted from the same by using benzene. The coal oil may also be regained by distillation."—G. S. HESSENBRUCH, Laclede Gas Light Company, St. Louis.

No. 10.—"*Method of Determining the Percentage of Carbon Dioxide in Furnace and Illuminating Gases.*—The accompanying sketch showing apparatus designed by Dr. W. Oechelhaeuser is well adapted for commercial and retort house use, and as can be seen it consists of two pear shaped glass globes *A* and *B* connected by a narrow neck *C*.



APPARATUS for CO_2 DETERMINATION
Wrinkle No. 10.

"There is an air tight glass stopper '*a*' in this contracted part and similar openings '*b*' and '*c*' are attached to the upper vessel.

"Through '*b*' a thermometer is snugly inserted with its bulb in the vessel *A*. The stopper '*c*' is provided with a simple stop cock, which connects by a conical glass connection to the siphon pressure gauge '*d*.'

"Imagine vessel *B* filled with a liquid that absorbs only CO_2 in furnace or illuminating gases, as KOH, or Na OH; and *A* filled with the gas under examination having the openings '*a*,' '*b*' and '*c*' closed.

Now the liquid will absorb the CO_2 present in the gas, particularly if the apparatus is turned upside down so that the gas must pass into *B* and then back into *A*. As a result of this absorption a partial vacuum will be created in the interior of the apparatus, the extent of which will be in exact proportion to the amount of CO_2 absorbed, and the amount of which can be observed by attaching the gauge '*d*' and opening the cock '*c*.'

"If the gas had consisted of pure CO_2, this would have been entirely absorbed, and a complete vacuum would have resulted in *A*. As a result of this the mercury column in the gauge would have risen to a height equal to that of the barometer. Had only half the gas been CO_2 the gauge would only have risen to one-half of the height of the barometer. Had only one-twelfth of gas been CO_2 the gauge would only have risen to one-twelfth the height of the barometer.

"Therefore according to Marioote's or Boyle's law: 'That the volume of a given quantity of gas is inversely as the pressure,' it is very easy to compute the amount of CO_2 in the gas. Suppose the barometer to be -b lines high and the gauge-b,-lines, the percentage of CO_2 is expressed by 100xb, b.

"With an average barometer of 30 inches or 7.60 m.m. would denote 1 per cent. of CO_2. Several corrections however are necessary for this mode of reckoning.

"First the space *A* is never void of air and contains moisture which affects the barometer reading. The variation due to this cause, however, is so trifling that it may be neglected.

"As a rule the temperature of the gas and the liquid is not the same, so that during the absorption the temperature of the liquid increases. It is therefore necessary to take the temperature of the gas before and after the test in order to reduce the volumes of even temperatures.

"For every change of 1° in temperature the gas changes .0036 or about $\frac{1}{3}$ per cent.; therefore if the temperature of the gas after the absorption is higher—for every degree of change $\frac{1}{3}$ per cent. of CO_2 must be added, for on account of the increased heat more pressure bears down on the mercury and makes the vacuum appear less than by even temperature before and after the absorption.

"Vice versa for every fall of 1°—$\frac{1}{3}$ per cent. is to be counted off.

"In using this apparatus the following must be observed: All stoppers and cocks must be made air tight by applying a little vaseline or tallow with the finger.

"Changes of temperature must be avoided, and the apparatus filled with its liquid should be placed in the room where the tests are to be made for some time before beginning, so that the apparatus reaches the same temperature as the room. Do not handle the apparatus, and particularly the vessel *A* with the bare hand; but use a piece of thick woolen cloth with which to hold it.

"To prepare the absorbing solution dissolve $\frac{1}{2}$ ounce or 16 grams (KOH or Na OH) caustic potash or caustic soda in enough distilled water to fill the apparatus to the neck.

"To better understand the handling a determination of CO_2 with the apparatus will be described. After the apparatus has stood for some time in the room where the experiment is to be made, so that the fluid has arrived at an even temperature with the room, clean the stoppers and cock '*c*' carefully, seeing that its opening is clear, and coat with vaseline or tallow. Dry the bulb of the thermometer.

"Now open the cock '*c*' and slip a rubber hose, connected with the supply of gas over the connection for the siphon gauge. After placing the thermometer in '*b*' allow the gas to enter the vessel *A*, and escape from the opening '*a*' so that it will gradually fill the apparatus. A hose connection to the suction of a rubber foot pump can be made to '*a*' by means of a cock, if necessary.

"After about one-tenth of a cubic foot of gas has passed the upper vessel will be filled with gas alone, it is well to have a large amount of gas pass quickly through *A*, however, before a sample is taken. The stopper '*a*' can now be put in, or in case a foot pump is used close the cock to same, and if the cock '*c*' is immediately closed the pressure in the apparatus due to the entering gas can be neglected. Remove the rubber tube from '*c*' and note the temperature of the gas at the thermometer. Now hold the apparatus at the narrow point *C* in the left hand by means of the woolen cloth, and turn it upside down, at the same time holding the thermometer steady with a finger tip of the right hand, and the gas will rise into vessel *B*. Repeat the manipulation a few times (about 10 suffices for 4 per cent. carbon dioxide) and the CO_2 will be absorbed.

"Place the apparatus on a table, attach the siphon pressure gauge to '*c*' tightly, open the cock '*c*' carefully, read the gauge and note the temperature, taking care not to approach the apparatus too closely with the hand or body. After two minutes read the full height of the quicksilver column and temperature again, then the percentage of CO_2 can be easily computed according to the data given above.

"For convenience the large divisions on the scale of the manometer

are 7.6 m.m. apart, which with an average height of barometer of 760 m.m. denotes 1 per cent. CO_2, as we have seen above.

"If the experiment is made at a time when the barometer is near 760 m.m., 20 m.m. difference only denotes a mistake of .027 per cent., so that the influence of the atmospheric pressure, as a rule, may be neglected, and if the temperature remains the same the percentage of CO_2 can be read directly from the scale of the gauge.

"If, on the other hand, the temperature of the gas before the absorption was 16°, and after 18½°, or 2½° higher, and the gauge read 1¼ per cent., the real amount of CO_2 present would have been ⅝ per cent. (2½ × ¼)—2 per cent.

"But if the temperature of the gas had been 2½° less after the absorption the real amount of CO_2 could have been 2 per cent.

"There is one more consideration, the fluid not only absorbs CO_2, but other gases and large mistakes may arise thereby if the solution is not saturated with these other gases before testing. It is therefore necessary before making a test to fill the vessel *A* with gas, and by tipping 10 or 12 times the solution is saturated with all other gases in the mixture undergoing test. If this is repeated a few times the gas and liquid can be brought to the same temperature in case the difference was not too great.

"It is always advisable to make several determinations in order to check the correctness of the results.

"Testing the carbon dioxide in gas is not only of interest but also of great importance in judging the operation of regenerative furnaces, various kinds of coal, and solving noticeable differences in the candle power of illuminating gas, which is markedly affected by the amount of CO_2 present.

"Every per cent. of carbon dioxide decreases the illuminating power of an ordinary flame consuming 5 cubic feet per hour at least 1 candle power.

"As a precaution before putting the apparatus away the openings should be dried, recoated with grease and closed. If this is observed one filling will last for 40 or 50 tests."—W. E. STEINWEDELL, Cleveland, O.

(To be Continued.)

[Prepared for the JOURNAL.]

The True Worth of Tar as Fuel.

By W. N. BEST, M.E., Los Angeles, Cal.

Fuel oil is fast winning its way and becoming prominent in the manufacturing world as a fuel because of its superiority over coke or coal; first, because of increased output and, second, because of the quickness and evenness with which furnaces and other apparatus can be heated in accordance with demands, as well as the entire elimination of the smoke nuisance. There is one liquid fuel that has been scarcely considered and yet its heat value, when considered by gallons or barrels, is greater than that of Texas crude oil. This liquid fuel is commonly called tar, the common product of the coke oven and water gas systems.

Numerous experiments have been made to burn these tars, but the difficulty has been to find a burner equal to the demand of an equipment, either for use in boilers for the generation of steam, or under gas retorts or coke oven benches. One of the great difficulties has been that the experimenters have used gas pipe burners, or other common burners of a similar type, that could not possibly atomize the fuel and were sure to carbonize and cause an uneven distribution of heat uuder the boilers, much to the detriment thereof and to the disappointment of the engineer in charge, in keeping up steam thereon. In retort equipment, instead of a burner throwing a narrow blaze, burners have been used which would throw a blaze that would impinge upon the brickwork of the setting, in a short time either impairing or ruining it.

The Barrett Manufacturing Company has made very exhaustive tests with various kinds of tar as fuel and has succeeded in demonstrating its full thermal value. These hydrocarbon burners referred to vary in sizes equal to the demands upon them by thoroughly atomizing the tar, and do not carbonize. The tar orifice is so formed that as the tar is forced from the burner it must pass the steam or air used in atomizing it, thereby causing every drop of the tar to be knocked into 10,000 molecules, which fact allows the oxygen of the air to mingle with the volatile gases caused by the thorough atomization of the tar. The atomizer slot of the burner being above the oil or tar orifice insures that the burner will not carbonize; in fact, these burners have been used under boilers for 18 months without having to be cleaned. By the novel form of the atomizer on burners used under boilers, a fan-shaped blaze is made that will span the entire width of the firebox, if the firebox does not exceed 9 feet in width, thereby allowing all the air admitted to pass up through the flame, and not as we often find equipments where the air is admitted between the flame and elements of the boiler. Another advantage is the use of the fan-shaped blaze. Ordinarily one burner is used under a boiler, unless the boiler firebox is of water tube type wider than 9 feet. Under these conditions two burners are used, but never exceeding two. This alone is an item to be considered, as it is well known that a man can always adjust one burner much more easily than he can several burners in a boiler.

These burners which are the result of 16 years' experience in burning oil, and which are used extensively in the Western and Southern States in marine, locomotive and stationary boiler equipments and various kinds of furnace equipments, are not an experiment, but have been thoroughly tested and through their merits were tested in tar fuel and have been found to burn any form of liquid fuel that will flow through a ½-inch pipe, from kerosene to the heaviest tars. The orifice through which the liquid fuel passes is very large and insures no stoppage of this cavity, which is well known to be of such great annoyance in other makes of burners.

When on a tour of investigation of methods in the study of arts and science in the equipment of various plants one is often amused when visiting these plants to see the crude methods of burning the liquid fuels. The burners used are often made of gas pipe, by the use of which it would be utterly impossible to thoroughly atomize the fuel, but by the use of which the fuel is simply carried into the firebox by a jet of steam surrounding the oil, or else the oil falls upon a flattened surface of pipe and is blown off by a jet of steam or compressed air.

Strange all the officials and employees claim this invention as their own; but stranger to say, you will see the same construction of burners in hundreds of different plants. and the same claim is laid to the burner by the officials and operators of all the various plants which you visit. On further investigation one will find that the same type of burner has been used for more than 30 years (either of pipe or cast iron form), and still further investigation will prove that their use has caused a loss of thousands of dollars in boiler repairs and wasted many thousand of firebrick unnecessarily, as well as having caused an irreparable loss in fuel.

In boiler equipment it is highly important, in order to get the highest possible efficiency from the tar or oil, that the equipment be made upon scientific principles, insuring that perfect radiation is had through the elements of the boilers. It is well known that no fuel can compare with liquid fuel in the point of perfect radiation and efficiency if the equipment is properly constructed. It seems to be the desire of some people when arranging for the use of liquid fuel to make the installation so that the heat will be forced out of the smokestack of the boiler as quickly as possible instead of retaining the heat in the firebox of the boiler and only allowing the consumed gases to pass away. I will say in passing that this form of equipment merely exhibits egotism rather than good judgment and brings disappointment and never success. This knowledge is not gained in a day or a month, but only by following well established laws known in calorifics. Without a knowledge of boiler equipment much damage may be done to boilers as well as possible loss of life of operator of some inferior type of burner. In a water tube boiler it is highly important to use deflectors for the flame in order to cover this very point of retaining the heat in the firebox and keeping the radiation in perfect control, while with return tubular boilers a different equipment is used.

In gas retort or coke oven benches a smaller burner is used, which, instead of throwing a fan-shaped blaze, throws a straight and narrow blaze that does not impinge upon the refractory setting, which, of ccurse, fills the requirement, especially when we consider that with tar or oil as fuel you can get a much more even distribution of heat than you could ever expect to get with any other fuel, for you have it under perfect control by the use of the atomizer of the burner and the supply of tar as it passes from it. As before stated, on account of the peculiar shape of this form of burner and the narrowness of the blaze, there is no abrasive or blowpipe blast effect upon the firebrick setting.

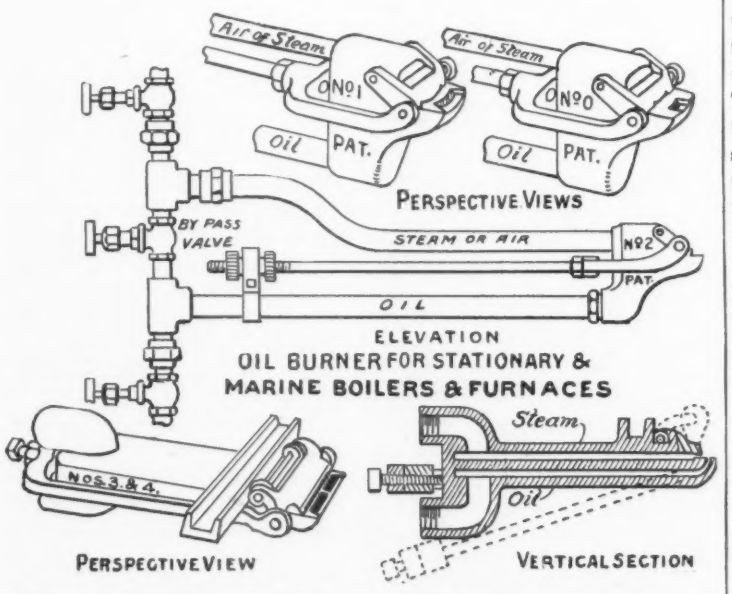
There is no question but that tar is as easily handled as ordinary crude oil which in many sections of our country has entirely revolutionized the fuels used in the equipment of locomotive, sationary and marine boilers aud in various kinds of furnaces. In the latter, the price of the fuel cannot be considered from the fact that the greatly increased output from the furnaces, as well as the superior quality of the iron and steel which is made more homogeneous, and the quickness of the control of the fire, make oil fuel a fuel to be sought and which is even in this far eastern country being fast exchanged for coal

and coal gas be cause of superior output of iron or steel. In open hearth furnace work and in steel foundries, liquid fuel is a necessity and in furnace work in blacksmith shops it is the demand of the hour. It is well known that in the use of coal or coke there is always corrosion in the welds, whereas in the use of oil fuel there is no corrosion whatever. In heating rivets, purchasers of boilers and tanks, etc., now often specify all rivets to be heated by liquid fuel to increase their tensile strength. Coal fuel has been found detrimental owing to the absorption of the carbon of the coal by the rivet. In any furnace equipment tar is as valuable as fuel oil or crude oil and can be as easily equipped and handled as crude oil.

Before considering the value of tar as fuel, I desire to say a few words regarding coal as fuel. Of course that fuel must be decomposed before being effective, and if from any cause smoke is emitted from the smokestack, it spells out false economy from the fact that it means a twofold loss. First it requires heat to liberate the gases from the coal; second, when using forced draft always a superfluous amount of air must be used—therefore, a loss in fuel and evaporation—in other words, you cannot get the full calorific value from the coal, and, third, if from any reason any of these gases pass away unconsumed it means an irreparable loss as well as a public nuisance, and we are hastening to a day when the smoke nuisance must be entirely eliminated from our cities. In fact, we are fast approaching that day, and I presume no manufacturers have received more severe criticisms than have gas works because of smoke nuisance.

We will now consider the heat value of oil fuel and various tar fuels. The analysis of Beaumont Texas oil is as follows:

Carbon	84.60 per cent.
Hydrogen	10.90 "
Sulphur	1.63 "
Oxygen	2.87 "
Calorific value	19,060 B.T.U. per pound.
Vaporizing point	142°.
Weight	7½ pounds per gallon.



Oil Burner for Locomotives.—W. N. Best, International Calorific Company, Los Angeles, Cal.—Plate 17.

Tar from coke ovens contains 16,263 B.T.U.'s per pound; tar from oil water gas contains 16,970 B.T.U.'s per pound; weight of these tars varies from 9 pounds to 10.29 pounds per gallon.

We will now consider the value per gallon and barrel of Texas crude oil and an average of the tars. One gallon of Texas oil contains 133,420 B.T.U.'s. Allowing 42 gallons of crude oil to equal 1 barrel, there would be 7,003,900 B.T.U.'s, but in our Eastern country 50 gallons of oil equals 1 barrel, which would bring this oil up to a calorific value of 7,147,500 B.T.U.'s per barrel of crude oil.

Averaging the tars at a calorific value of 16,250 B.T.U.'s, and the weight of the tar at 10 pounds per gallon, 1 gallon would contain 162,500 B.T.U.'s per gallon; 50 gallons, or 1 barrel, contains 8,125,000 B.T.U.'s, making a difference in the calorific value in favor of tar of 977,500 B.T.U.'s per barrel of 50 gallons.

A few years ago some tars were considered as having no value and were allowed to defile our rivers and cause considerable trouble, both for the citizens of the various cities and also for the gas companies themselves, when in fact they were considering as a waste product the most valuable fuel, other than that of pure hydrogen gas, which has a calorific value of 62,000 B.T.U.'s per pound.

All of the various cities, as well as gas manufacturers, will welcome this new fuel and will aid in every possible manner in its introduction. This cannot be done through the idle curiosity of experiments or an egotistical display of false judgment, but it can be done, and is being done successfully in this city and elsewhere, to the satisfaction of the most exacting, and especially to the satisfaction of its users.

The equipment is simple and durable, and the burners can be operated effectively by anyone of average intelligence without danger to themselves or to the property of the company and insures the entire elimination of the smoke nuisance and gaining the highest efficiency from the fuel, without any detrimental effect to boilers or settings.

The burner and entire equipment are foreign in construction and principle to any other system or burners, and have been in use, using both the lightest and heaviest grades of oil, for years with success.

The accompanying cut illustrates the form of burners referred to. The No. 0 burner is particularly adapted for retort and coke oven bench settings. The No. 1 is for stationary boilers up to 100-horse power capacity. The No. 2 is of a capacity from 100 horse power to 500-horse power.

Metal Mixers for Pipe Foundries.[1]

By J. B. Nau, New York.

Some time ago the writer had an opportunity to take a trip through some of the most modern European foundries and noticed that in many ways these foreign foundries are ahead of American practice. This was more especially to be seen in pipe foundries. The pipe specifications of Europe, while very strict and exacting in many ways, in fact, more so than in the United States, leave the manufacturer some latitude not enjoyed here. This is especially true in regard to the iron used. Whenever possible, for obvious reasons, the European manufacturer makes use of direct metal from the blast furnace. Of course, every precaution is taken always to obtain an even quality of iron by mixing the metals running from the different furnaces in special ladles, or in mixers of special design that can run from one furnace to the other. The principal aim of the manufacturer is naturally to give full satisfaction to the buyer, who, as is proper, insists that the pipe bought shall fill all the conditions of the specifications in regard to physical tests and strength of the metal. The buyer on his side insists simply on the pipe coming up to the specifications and leaves the manufacturer unhampered as to the source from which he should take his iron.

From long experience the manufacturer is well aware that he can satisfy all physical tests with iron whose analysis may vary within certain limits and that he can obtain the right quality either by mixing the iron from different blast furnaces or, if necessary, by correcting this direct metal by admixing a certain amount of metal melted in the cupola. This item of quality is generally very carefully attended to and the pipes made, especially in some of the most important French and German plants, where the best working methods in other respects are employed, is invariably of good quality.

It can be readily understood that the use of liquid metal directly from the blast furnace is fraught with many difficulties and its indiscriminate use is liable to produce pipes of uneven and uncertain quality. That this is so is well illustrated by the fact that the American pipe specifications, in order to eliminate the factors of uncertainty and of uneven quality, prohibit the use of direct metal in the manufacture of pipes, and specifically state that the iron should be remelted in a cupola or an air furnace. Of course, this remelting leaves no excuse to the manufacturer in regard to the quality of his iron, but still it has disadvantages that cannot be overlooked, one of which is the greatly increased cost of the iron when thus remelted. Another disadvantage lies in the danger of deteriorating the quality of the iron to some extent by increasing its sulphur content from the contact with fuel or flame. The best and cheapest would naturally be to follow the practice already described, by mixing the different brands of irons running from the various blast furnaces and, if necessary, to correct the quality of the irons so mixed with irons remelted in the cupola. Such a proceeding, prohibited by American specifications, is only possible where the foundry is built near the blast furnace. Foundries not so located are naturally excluded.

Still, in order to get all the benefit that the use of direct metal would undeniably afford and yet avoid all the danger of the uneven quality,

1. A paper read before the American Foundrymen's Association, New York, June, 1905.

that alone guided the framers of the American specifications in prohibiting the use of direct metal, the use of a heated mixer of sufficient capacity is here recommended. A few years ago such mixers were introduced in Europe in connection with steel works and they gave the very best satisfaction. The writer had occasion to see one such heater of a capacity of 250 tons in a basic Bessemer steel works. It was heated with producer gas and provided with regenerators. Such a mixer is more to be considered in the nature of a gas heated air furnace, with the exception that the iron, instead of being melted in it, is brought liquid from the blast furnace and poured into the mixer, where it can be kept hot and liquid for any desired length of time.

Heated Mixers Preferred.—Since the steel works find that heated mixers give such good satisfaction, why should the foundrymen not follow in the same steps wherever it is possible to do so? The small non-heated mixer that the writer saw in some German pipe foundry gave good satisfaction and the iron could still be used after 2 hours' waiting. Heated mixers would give better satisfaction undoubtedly. Under the action of the flame, which must be of a slightly oxidizing nature, some undesirable refining of the iron would take place and a a small part of the silicon and manganese would be burned out. But as the iron is poured liquid into the mixer the oxidation of silicon and manganese would be much less than in the air furnace or the cupola, where from ¼ to ½ of the silicon is burned out, mostly during the melting period. In this respect the heated mixer, where no melting is done, should be far more advantageous.

But it has other advantages. It is a well-known fact that the mixer as such is an excellent apparatus for eliminating in a short time a large percentage of the sulphur contained in the iron. In fact, this elimination reaches easily 50 and 70 per cent. The quality of the iron will, therefore, be considerably improved in the mixer. In the cupola the contrary always happens.

Since the metal can be kept hot to any degree in the mixer, this affords us means to correct at once the quality of the metal by throwing and melting in it whatever cold pig may be necessary to obtain the right analysis.

Thus the use of the heated mixer for foundry purposes in connection with the blast furnace would seem to present very marked advantages:

1. It would allow the use of direct metal from the blast furnace thereby saving the remelting cost, which is always high.
2. It would afford an easy and cheap means of eliminating a large percentage of sulphur, thereby, contrary to cupola practice, improving the quality of the iron.
3. It could be used directly to correct the quality of the metal by melting in it a certain amount of cold pig iron, with probably less cost than when the melting is done in the cupola and with certainly less absorption of sulphur during the melting, because the solid pig will melt in the liquid bath and be removed from contact with the flame.

Naturally such a mixer could be used for other than pipe foundry purposes when proximity to the blast furnace allows its adoption. It would even allow an independent large foundry to use liquid iron from a nearby blast furnace belonging to another company. Both companies would benefit by the practice.

Features of European Pipe Foundries.—Coming back again to European pipe foundry practice, which led us to the above consideration of mixers, many other improved methods are applied, all tending toward a general cheapening everywhere. What one notices first in the most modern European pipe foundries is the complete absence of pits. The molding and pouring are done on an upper floor, to which one-half of each pipe flask is fastened; the other half is left free to be slid back. The flasks are never taken from their place. The finished pipe alone is lifted up by the crane, which having less weight to lift can be lighter than would otherwise be the case. The lower end of the flask hangs freely down to within a certain distance of a lower floor and is accessible from every side. The drying of the flasks is done by means of producer gas or even blast furnace gas. The producer gas is made in gas producers situated outside the works and let through underground gas flues underneath the rows of flasks. Here special burners, varying in the different foundries, are used to dry each flask thoroughly and rapidly. In most places gas is also used to heat the core ovens. These arrangements also vary in different places.

In one foundry in eastern France, where coke is very expensive (fully $5 a ton), special arrangements are made to burn coke screenings from blast furnace coke in the core ovens. The use of this fine coke, otherwise lost, was the cause of a very great saving in the drying of the cores. After the pipe is cast the sand falls from the flask and is taken up by conveyors, and after being cleaned and screened is taken by conveyors to the top floor, where it will be used again in the ramming of the flasks. In some foundries the flasks are put up exclusively in straight parallel rows; in others, especially for pipes of less than 25 inches diameter, revolving pits or drums are used, somewhat similar to what is done at the Chattanooga plant.

In the case of revolving systems the drying of the flask is also obtained with gas. Some very ingenious drying appliances are used in these systems. Tarring appliances also are very modern and of an improved style. In fact, the work everywhere is reduced to a minimum.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

A CORRESPONDENT in Boston forwards the following under date of the 16th inst.: "The consolidation of the Boston Gas Companies is a thing accomplished. At 1 P.M. yesterday the little knot of gentlemen who had busied themselves all morning with stockholders' meetings, the signing of papers, and the transfer of checks in a private room at the National Shawmut Bank, drew back from the table and the thing had been done. The Boston, Brookline, Jamaica Plain, South Boston, Dorchester, Roxbury, Bay State and Massachusetts Pipe Line Companies had met and voted to sell their properties to the Boston Consolidated Gas Company; the latter had voted to buy; the sale had been consummated by the drawing of deeds, the execution of bills of sale and their transfer for certified checks; and the consolidation had been accomplished beyond the possibility of recall or interference. The following table gives the number of shares of the different Companies which were voted in favor of selling to the Boston Consolidated:

Dorchester Gas Light Company	5,185
South Boston Gas Light Company	4,383
Roxbury Gas Light Company	5,993
Massachusetts Pipe Line Company	10,000
Jamaica Plain Gas Company	2,441
Boston Gas Light Company	4,994
Brookline Gas Light Company	19,998
Bay State Gas Company of Massachusetts	19,993

"The only ripple on the surface of a deal involving more than $15,000,000 was the appearance on the scene of the redoubtable J. Edward Addicks, once the Napoleon of Boston gas, but to-day merely a minority stockholder in some of the corporations involved. Mr. Addicks's reappearance in the local gas situation was short, dramatic, ineffective. He protested, voted his stock against the deal, and threatened to get out an injunction to stop its consummation. This threat did not materialize, however, though Mr. Addicks departed before the final scene in the transaction had been enacted. Those who recall Mr. Addick's entry into the Boston gas field some years ago could not but contrast its éclat with his somewhat inglorious exit to-day. Then he was buying Boston gas stocks at fabulous prices. To-day he departed, still the owner of some shares—said to be not more than 5 in any one of the Companies interested—but about to be shorn of even these by the processes of the law. Like the other minority shareholders he will be informed as to the amount of money due him under the terms of to-day's sales. If satisfied with the amount, he will receive it in cash; if not, he has, under the law, recourse to the Massachusetts courts, which will appraise the value of his shares, which he is bound to accept. Of all the shares in the 8 Companies, not more than 70, including those of Mr. Addicks, are held by persons outside the Massachusetts Gas Companies, promoters of the deal.

"The terms on which the 8 Companies sold their entire properties as going concerns to the Boston Consolidated Gas Company are not to be made public. The properties inventory something like $24,000,000, as was determined at the time of the inquiry by the Gas and Electric Light Commissioners under the consolidation act of 1904; but as the minority interests are so small the promoters are virtually in the dual position of buyer and seller, and the actual prices paid do not much matter. All the stock of the Massachusetts Pipe Line is in the treasury of the Massachusetts Gas Companies, and, as stated above, all but some 70 shares of the other 7 Companies are also the property of the Massachusetts Gas Companies. The Massachusetts Gas Companies will hold in its treasury all the stock of the Boston Consolidated Gas Company, using its income to pay dividends on its own stock. If Consolidated should earn 8 per cent., as is thought likely, the proceeds will suffice to pay 4 per cent. on the $25,000,000 of Massachusetts gas preferred, and leave enough to pay 1 per cent. on the $25,000,000 of Massachusetts gas common, irrespective of any earnings from the association's other important property, the

New England Gas and Coke Company. Although the inwardness of the local gas consolidation has been thoroughly discussed during the last 6 months, the accomplishment of to-day may be briefly reviewed as to its effects. The 8 Companies named are consolidated under Chapter 417 of the Acts of 1904, as amended by the Legislature of 1905, in the matter of the capitalization to be allowed the new Company. As soon as the minority stockholders are paid the value of their holdings, the existence of the 8 Companies named will terminate, and the gas business in the local field be done by a single Company. The Consolidated is capitalized at $15,124,600, being the sum of the stocks, bonds and certificates of indebtedness of the merging Companies. This sum was fixed by the General Court of 1905, after much opposition had developed to the original plan of capitalization on an asset basis—which would have given the new Company about $20,000,000 capital. The merging Companies are required to pay their bonds and certificates of indebtedness, and all other liabilities are assumed by the Consolidated. A condition of the consolidation is that the new Company shall furnish gas at 90 cents per 1,000 cubic feet within a year from to-day. It has filed its acceptance of this provision, and it is intimated that the Company is preparing a pleasant surprise for its customers in addition. In carrying out the plans set on foot to-day there have been filed with the Commissioners certificates of the various Gas Companies, stating that by a vote of over two-thirds of the stockholders these Companies have agreed to transfer their property, rights and franchises to the Boston Consolidated Gas Company. As a step toward cheaper gas the Boston Consolidated Gas Company has petitioned the Commissioners for the approval of a contract which it has made to day with the New England Gas and Coke Company, providing for the sale to it by the latter Company until December 1, 1907, at 14 cents per 1,000 feet of unpurified gas of 12-candle power. The former contract made in 1897 was for a term of 50 years and the price was 15 cents. This contract the Boston Consolidated Gas Company wishes to abrogate. The Consolidated Company files the following statement: 'The Boston Consolidated Gas Company has entered into a written contract with the New England Gas and C ke Company for the purchase of gas. This contract provides: That the Commissioners will find that the prices to be paid for the gas to be purchased as stated in said contract are less than it would cost the Boston Consolidated Gas Company to make its own gas with works of standard type properly equipped, suitably situated and of sufficient capacity to make all the gas required for the whole district to be supplied.'"

THE Bangor (Pa.) Gas Company has been purchased by Messrs. Wilson F. Jordan, Milton Flory and William Bray. In the reorganization the following officers were elected: President, W. F. Jordan; Secretary, H. E. Flory; General Manager, Davis Hambright.

MR. J. A. MAYERS informs us that he has secured for the Gas Machinery Company, of Cleveland, O., a contract to install on the Stamford (Conn.) gas plant, a condensing, scrubbing, washing and purifying output up to "cleansing" a daily output of 1,000,000 cubic feet. The purifiers are to be fitted with the Machinery Company's latest design of valve for the reversal of flow, which is said to satisfactorily accomplish this independent of the gate valve system regulating the sequence of boxes. The water gas washer is of the type now generally used for removing the tar and oily matter from water gas, and which at the same time raises the temperature of the gas before it enters the purifiers.

A VERY pleasing and satisfactory demonstration, on the art of preparing cooling dishes, was that given by Miss Helen Parker Headden, in the handsome assembly hall of the Denver (Col.) Gas and Electric Company, the morning of last Wednesday. Quite close to 500 of Denver's "best citizens" were present at the lecture-demonstration.

AN application will be made to-morrow to Governor Pennypacker, of Pennsylvania, for a charter for a corporation with the title of the Shenandoah and Mahanoy City Gas Company, to "manufacture and supply gas for light, heat, fuel and power, in the boroughs of Shenandoah and Mahanoy City, and the townships adjoining." The applicants are H. M. Bradigan, Jno. J. O'Hearn, Christian Gruhler, David M. Graham and Paul W. Houck.

ANOTHER proposed Pennsylvania gas corporation, to be known as the Citizens Gas Company, of East Stroudsburg, will seek a charter from the Governor on the 11th prox. The incorporators are Messrs. A. A. Holbrook, A. M. Palmer and Milton S. Kistler.

MR. FRANK LANE has been appointed Assistant to Mr. H. H. Harper in the management of the Altoona (Pa) Gas Company.

IT is thought that the new plant of the New Haven (Conn.) Gas Light Company will not be in complete working order before mid-September.

MR. E. E. HULL, of Kingfisher, Okla., President of the Citizens Gas Light, Heat and Power Company, of Roswell, N. M., says the plant of that concern will be in going order by August 20th.

MR. D. M. ROWLAND has resigned the Secretaryship of the Marengo (Ia.) Gas Company. His successor is Mr. A. M. Henderson.

IT is likely that before the summer season is ended the proprietors of the Providence (R. I.) Gas Company will have placed the net selling rate at $1 per 1,000 cubic feet.

THE following is from an official notice recently issued at the instance of Mr. James L. Richards, President of the Boston Consolidated Gas Company: "On July 1st, 1905, the price of gas will be reduced to 95 cents per 1,000 cubic feet, and on January 1st, 1906, a further reduction to 90 cents per 1,000 cubic feet will be made. It is the desire of the Boston Consolidated Gas Company to give the best service possible, and at the lowest price for which the same can be provided. In the event of consumers receiving improper treatment from anyone connected with this Company they are earnestly requested to communicate in writing with the President, who will give their cummunications his prompt attention."

THE Gas Machinery Company, of Cleveland, O., has been awarded the contract for the reconstruction of the plant of the Winona (Minn.) Gas Company, which contract includes the installation of a new coal gas apparatus.

AT the annual meeting of the Westmoreland Coal Company the officers elected were: President, E. H. McCullough; Vice-President, H. C Adams; Treasurer, C. F. Godshall; Secretary, Henry Wharton.

EXTENSIVE improvements are contemplated by the new Light, Heat and Power Company, of Newark, N. Y., which property was recently sold through the Gas and Electric Development Company, of Philadelphia, Pa. The new owners expect to assume the operation of the plant July 1st and proceed at once with the execution of their plans.

THE following comes to us by way of the Meriden (Conn.) *Record* of recent date: "Congratulations to Ansonia. Meriden knows exactly to what inconveniences the public has been subjected on account of the burning of the lights only a portion of the night. Now Ansonia is to have all night service and there is general rejoicing over the fact. The following arguments by the *Sentinel* sound natural as many of them were offered by the *Record* when the subject was under discussion here. Ansonia has always believed in letting her lights shine, and now that she is going to have them shine all night instead of only a part of it, she may be said to have taken a commendable step forward. The action of the Board of Aldermen, in voting for a 10-year, all-night lighting contract with the Derby Gas Company is bound to win popular approval throughout the city. The mooted question has been raised as to whether the present city government has the right to bind future governments by a long-term contract. This is pretty well answered by the fact that the city is just completing a 5-year contract and hence is simply following precedent when it enters into another contract, though for a longer period. There may be a few, too, who will groan over the expense, but the additional cost of having lights all night, instead of only a part of the night, is so slight in comparison with the benefits to be derived that it is almost a wonder that the city had not adopted a similar arrangement in years past. Had it done so it might have been spared not a few of the burglaries and holdups which have taken place, and at the same time have enjoyed a convenience such as nearly every city of the size of Ansonia enjoys and would not give up for considerable more than what it costs."

MR. W. H. ROSS has resigned the superintendency of the Bowling Green (O.) Gas Company. His successor is Mr. A. B. Morton.

MR. WILLIAM VON PHUL has resigned the position of General Superintendent of the electric division of the business of the Cincinnati Gas and Electric Company.

The Market for Gas Securities.

The feature of the city gas share market for the week was a sharp advance in Consolidated, which shows a gain of 5 points in the bid price since last quotation. The closing to-day (Friday) was 190 to 191¾. The advance is said to be on account of short covering, but it also may be explained on the ground that the current figures even are ridiculously low for it.

Brooklyn Union is 185 to 195. Investors in the latter are looking curiously at the Commission situation. Laclede are stronger, 97 to 105, with a selling figure of par, being the set figure. Cincinnati Gas and Electric is a point off, and Peoples, of Chicago, is a point on. The market as a whole is strong, and gas bonds of almost any sort are sure to bring out a bid.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 Wall Street, New York City.

June 26.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$78,177,000	100	190	191¾
Central Union, Bonds, 5's.	3,000,000	1,000	108½	110
Equitable Bonds, 6's	1,000,000	1,000	..	103
" 1st Con. 5's	2,300,000	1,000	118	120
Mutual	3,500,000	100	300	320
Municipal Bonds	750,000	..	..	..
New Amsterdam Gas Co.. Bonds, 5's	11,000,000	1,000	112	113½
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	35	..
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	..	..	..
Northern Union, Bonds, 5's.	1,250,000	1,000	104	106
New York and East River.. Bonds 1st 5's	3,500,000	1,000	112	114
" 1st Con. 5's	1,500,000	..	106½	108½
Standard	5,000,000	100	125	130
Preferred	5,000,000	100	145	155
Bonds, 1st Mortgage, 5's	1,500,000	1,000	116	117
Yonkers	299,650	500	130	..
Out-of-Town Companies.				
Brooklyn Union	15,000,000	100	185	195
" " Bonds (5's)	15 000,000	1,000	113	115
Bay State	50,000,000	50	¼	⅜
" ncome Bonds	2,000,000	1,000	..	75
Binghamton Gas Works..	450,000	100	..	65
" 1st Mtg. 5's	509,000	1,000	93	96
Boston United Gas Co.— 1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	6	7
" " Bonds, 5's	5,250,000	1,000	66	68½
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000	..	..
Chicago Gas Co. Guaranteed Gold Bonds	7,650,000	1,000	104	104¼
Cincinnati Gas and Electric Co	29,500,000	100	106	107
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	97½	99
Columbus (O.) Gas Lt. & Heating Co	1,682,750	100	88¼	89½
Preferred	3,026,500	100	107½	109
Consumers, Toronto	,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	83	84
Mortgage, 6's	3,600,000	..	..	118
Chesapeake, 1st 6's	1,000,000	..	..	..
Equitable, 1st 6's	910,000	..	..	..
Consolidated, 1st 5's	1,490 000	..	..	112
Consolidated Gas Co. of N.J.	1,000,000	100	15	17
" Con. Mtg. 5's	880,000	1,000	89½	92
Bonds	75,000	..	..	100
Detroit City Gas Co	4,825,500	50	..	50
" Prior Lien 5's	5,603,000	1,000	..	98
Detroit Gas Co., 5's	381,000	1,000	75	80
" Inc. 5's	16,000	100	98½	100
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Essex and Hudson Gas Co.	6,500,000	..	39	40
Fort Wayne	2,000,000	..	..	..
" Bonds	2,000,000	..	55	..
Grand Rapids Gas Lt. Co. 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	..	104½	105½
" " Bonds, 5's	10,500,000	..	107	108
Indianapolis	2,000,000	..	70	75
" Bonds, 6's	2,650,000	..	106½	108
Jackson Gas Co	250,000	50	82	..
" 1st Mtg. 5's	290,000	1,000	101	102½
Kansas City Gas Light Co., of Missouri	5,000,000	100	..	36
Bonds, 1st 5's	3,822,000	1,000	102	104

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Harbison-Walker Refractories Co., Pittsburgh, Pa 1018
Henry Maurer & Son, New York City 1028
James Gardner, Jr., Co., Pittsburgh, Pa 1028
J. H. Gautier & Co., Jersey City, N. J 1028
Laclede Firebrick Mfg. Co., St. Louis, Mo 1020
Missouri Firebrick Co., St. Louis, Mo 1023
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Fred. Bredel Co., Milwaukee, Wis. 1030
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VERTICAL S'S.

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Connelly Iron Sponge & Gov. Co. (Drake's [Eng.] System) 1029
Fred. Bredel Co., Milwaukee, Wis. 1030
Parker-Russell Mining and Mfg. Co., St. Louis, Mo. 1018

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Bartlett, Hayward & Co., Baltimore, Md. 1033
Fred. Bredel Co., Milwaukee, Wis. 1030
J. H. Gautier & Co., Jersey City, N. J. 1028
Laclede Firebrick Mfg. Co., St. Louis, Mo. 1020
Parker-Russell Mining and Mfg. Co., St. Louis, Mo. 1018

(*Continued on page 1016.*)

DIVIDEND NOTICE.

OFFICE OF THE UNITED GAS IMPROVEMENT CO.,
N. W. CORNER BROAD AND ARCH STS.,
PHILADELPHIA, PA., June 14, 1905.

The Directors have this day declared a quarterly dividend of 2 per cent. (one dollar per share), payable July 15th, 1905, to stockholders of record at the close of business, June 30, 1905. Checks will be mailed.

1567-4 LEWIS LILLIE, Treasurer.

POSITION WANTED.

A good, all around gas man, with 12 years' experience in all lines, wishes to engage with some company which needs pushing. Can show results from present place per year. At present employed as superintendent of a plant with output of 60,000,000 annually. Best references.

Address, "TON,"

1566-tf Care this Journal.

POSITION WANTED.

Technical Engineer Desires Engagement.

Sixteen years' experience in all detail of construction, operation and management of gas and electrical properties. Thoroughly familiar with uniform system of accounts. Best of references. Address, H.,"

1568 3 Care this Journal.

Position Wanted

As Superintendent or Assistant Superintendent in Coal or Water Gas Works.

Well versed in preparing oxide for purifying purposes.

1568-1 Address, "M J L.," care this Journal.

WANTED,

A FIRST-CLASS GASFITTER,

Experienced in connecting gas appliances, house piping and general gasfitting.

Address, WILLIAMSPORT GAS COMPANY,
1568-1 Williamsport, Pa.

WANTED,

Experienced Gas Maker,

To operate Lowe Improved Water Gas Set.
Address, "S. S. Y.,"

1567-2 Care this Journal.

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Wanted, a competent engineer to take charge of the manufacturing and distribution of a large company. Must be a technical graduate and experienced in both branches of the business. This is a straight engineering job and a good opening for the right man. Applicants must be prepared to furnish references from present and past employers.

1567-3 Address, "X.," care this Journal.

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TO BUY A GAS PLANT,

In a town of not not less than 10,000 population. Address,

CARROLL COLLINS,
1567-3 314 Marion St., Elkhart, Ind.

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An Analyst for a Gas Company.

Preference will be given to one who has had practical experience in testing gas and its by-products, coal and other material used in the production and purification of gas. State age, experience, and salary expected. References required.

Address, "X. Y. Z.,"

1567-2 Care this Journal.

FOR SALE. The Consumers Gas Trust Co., of Indianapolis, Ind., offers for sale its entire plant inside of the corporate limits of Indianapolis, consisting of all its high and low pressure mains, including all service connections belonging to the Consumers Gas Trust Co., reserving therefrom only cash in bank and bills, accounts and other moneys receivable, office fixtures and real estate at the southwest corner of Illinois and 22d streets. Sealed bids will be received until 12 o'clock noon on the 11th day of Sept., 1905. Each bid must be accompanied with a certified check on some bank or trust company in the city of Indianapolis for the sum of fifty thousand (50,000) dollars, payable to the company, which will be held as a forfeit as agreed and liquidated damages, without returning in whole or in part in case the bid is accepted and not fulfilled. The Consumers Gas Trust Co., by its directors, reserves the right to reject any or all bids. All bids and communications should be addressed to Horace McKay, Chairman of the Finance Committee, 31 North Pennsylvania street, Indianapolis, Ind. There are no liens of any kind upon the property.

(Signed) HORACE McKAY,
Chairman Finance Committee.

Attest: BEMENT LYMAN,
Secretary.

Indianapolis, Ind., May 27th, 1905. [Seal.]

1566-3m

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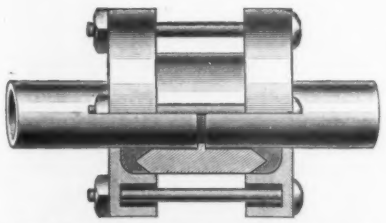
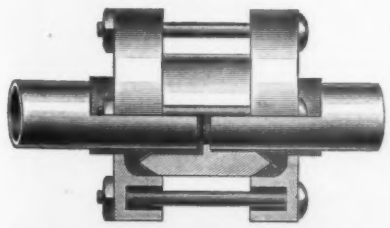
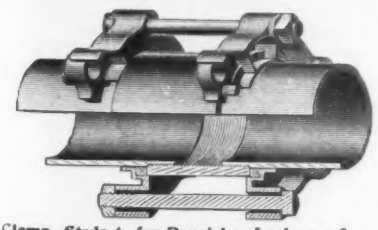


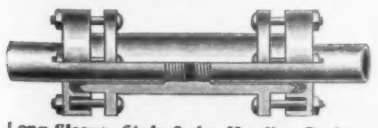
Regular Coupling, Style 1, for Plain End Wrought Iron Pipe.



Insulating Coupling, Style 5, for Plain End Wrought Iron Pipe,



Clamp, Style 4, for Repairing Leaks on Screw Collar.



Long Sleeve, Style 2, for Mending Broken Lines.

S. R. DRESSER,

BRADFORD, PA., U. S. A.,

Patentee and Manufacturer of Specialties for Gas and Water Lines,

Pipe Couplings, Sleeves, Clamps, Crosses, Tees and Ells.

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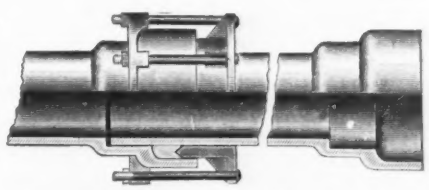
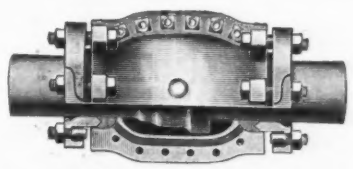
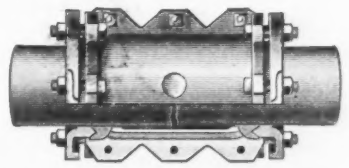


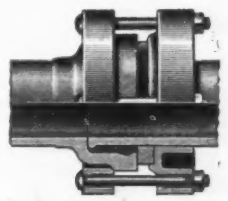
Coupling, Style 9, for Special Style Cast Iron Pipe.



Split Sleeve for Repairing Broken Bell on Cast Iron Pipe.



Split Sleeve for Repairing Broken or Cracked Cast Iron Pipe.



Clamp, Style 4½, for Repairing Leaky Lead or Cement Joints in Cast Iron Pipe

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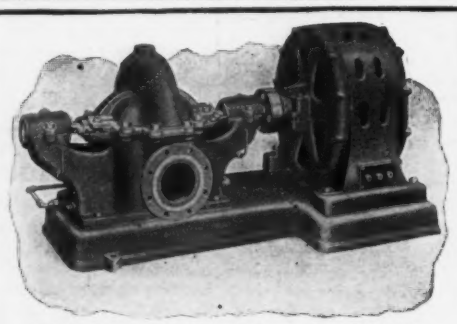

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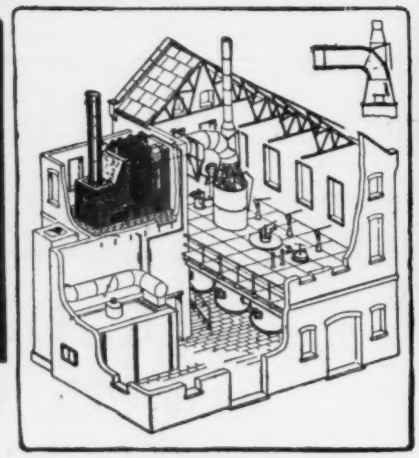
WE BUILD AND INSTALL MECHANICAL DRAFT PLANTS



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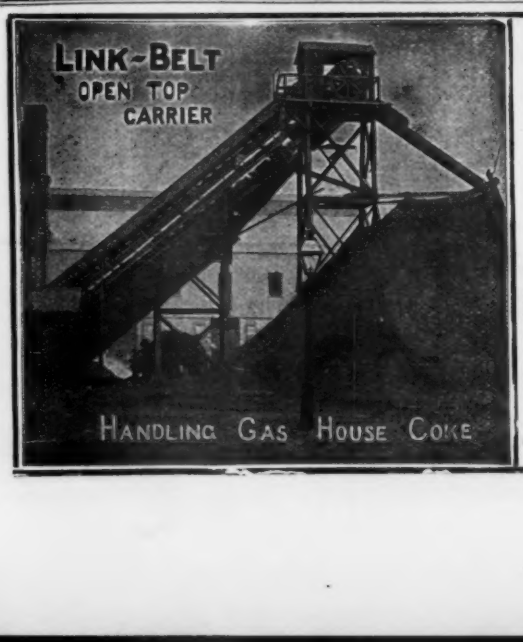

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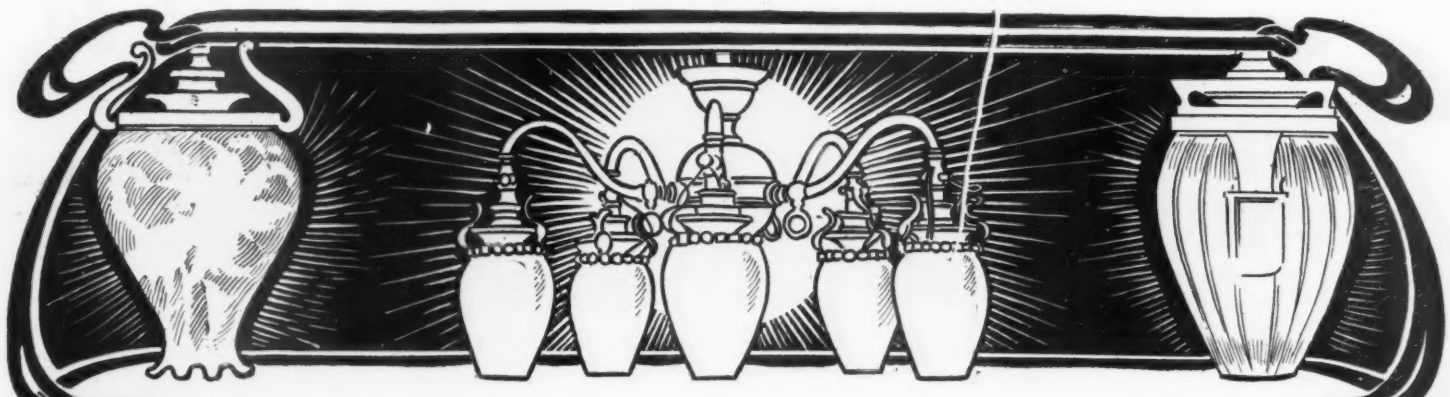

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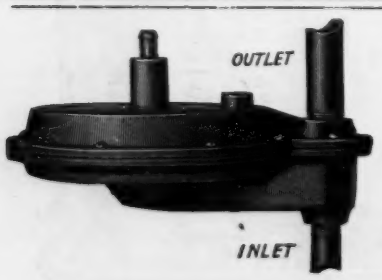

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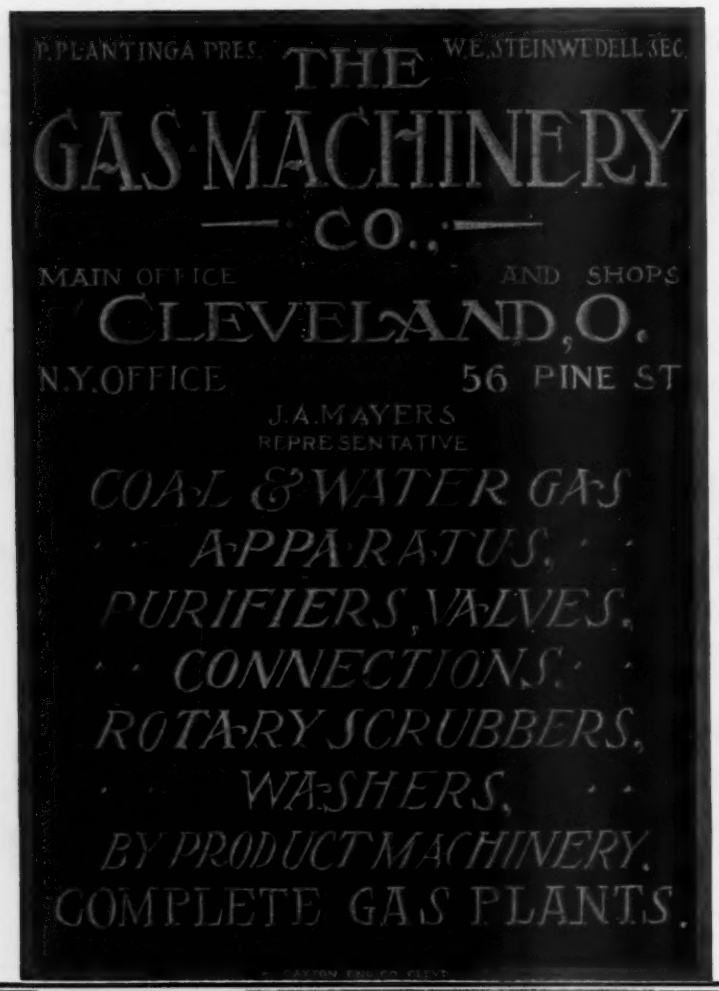

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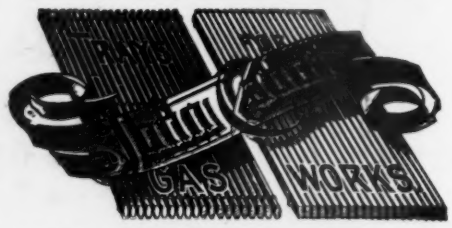

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But all you save on the first cost wil be lost a hundred times over in the increased number of complaints and dissatisfied consumers.

DON'T PUT GOOD GAS IN THE HOLDER AND SPOIL IT AT THE BURNER.

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Have been used by the largest Gas Companies for over forty years, because

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Have you a Bray Blue Book? SOLE AGENTS FOR THE UNITED STATES.

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Ludlow Valve Mfg. Co.,
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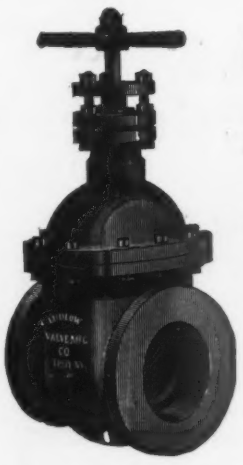
Double and Single Gate Valves, ¼" to 72",
—FOR—
Gas, Water, Steam, Oil, Ammonia, Etc.



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The Link-Belt Carrier is in daily service in many establishments throughout the country. It handles coal, coke, ashes, etc., easily and without transfer. It is strong and durable, and adaptable to many difficult conditions.
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Our specialty is building machinery for the economical handling of coal and coke in gas plants. Send for new catalogue containing illustrations and descriptions of plants we have installed, if you are interested in the economical handling of these materials.

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By HENRY O'CONNOR.

Comprising Tables, Notes and Memoranda relating to the Manufacture, Distribution and Use of Coal Gas, and the Construction of Gas Works.

PRICE, $3.50.

For Sale by

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COAL TAR
—AND—
AMMONIA.

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BY
GEORGE LUNGE, Ph.D.

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Gas and Electricity Manufacturing Enterprises,
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EMPIRE GAS IMPROVEMENT AND CONSTRUCTION CO.

This Company has purchased the patents and goodwill in the business hitherto carried on and owned by *A. M. Sutherland.* It is now ready to contract for the erection and installation of

ENTIRE GAS WORKS,

or any separate portion of the same, such as **Gasholders, Coal Gas Benches, Lowe-Sutherland** double-superheater **Water Gas Sets,** Scrubbers, Condensers, Exhausters, Purifying Boxes, Street Governors, Street Mains and Main Laying.

The high character of the work done by A. M. Sutherland during the past 15 years will be strictly adhered to and all work is warranted.

Mr. Sutherland remains with the Company for two years President and Director, and will give personal attention to contracts.

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See it Grow!

Lloyd's Rubber Lute

From January 1st, 1905, to date,
Has been contracted for on Purifiers aggregating

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Cubic Feet Daily Capacity.

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ONLY LICENSED BUILDERS:
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ANGLE PATTERN.

C—1242.

It is often desirable to have a stove cock close to the wall and have the handle in a horizontal position. This can't be done with most cocks, where the pipe enters through the floor, without the use of several fittings.

Mueller Angle Pattern Stove Cocks do not require the usual fittings, but screw directly to the perpendicular pipe within ¼ inch of the wall by means of a straight coupling and nut, with the handle horizontal over the stove connection. In this they are more convenient than others.

Mueller Angle Pattern Stove Cocks have a malleable iron coupling nut with female iron pipe threaded coupling nut and a handle of malleable iron. The body of the cock is cast brass.

Each cock is carefully inspected and assembled, is given a 75-pound hydraulic pressure test as near like actual service use as possible, bears the Mueller trade mark, and is *unconditionally guaranteed*

We also make tapping machines and meter connections for gas works' use. Catalogues upon application.

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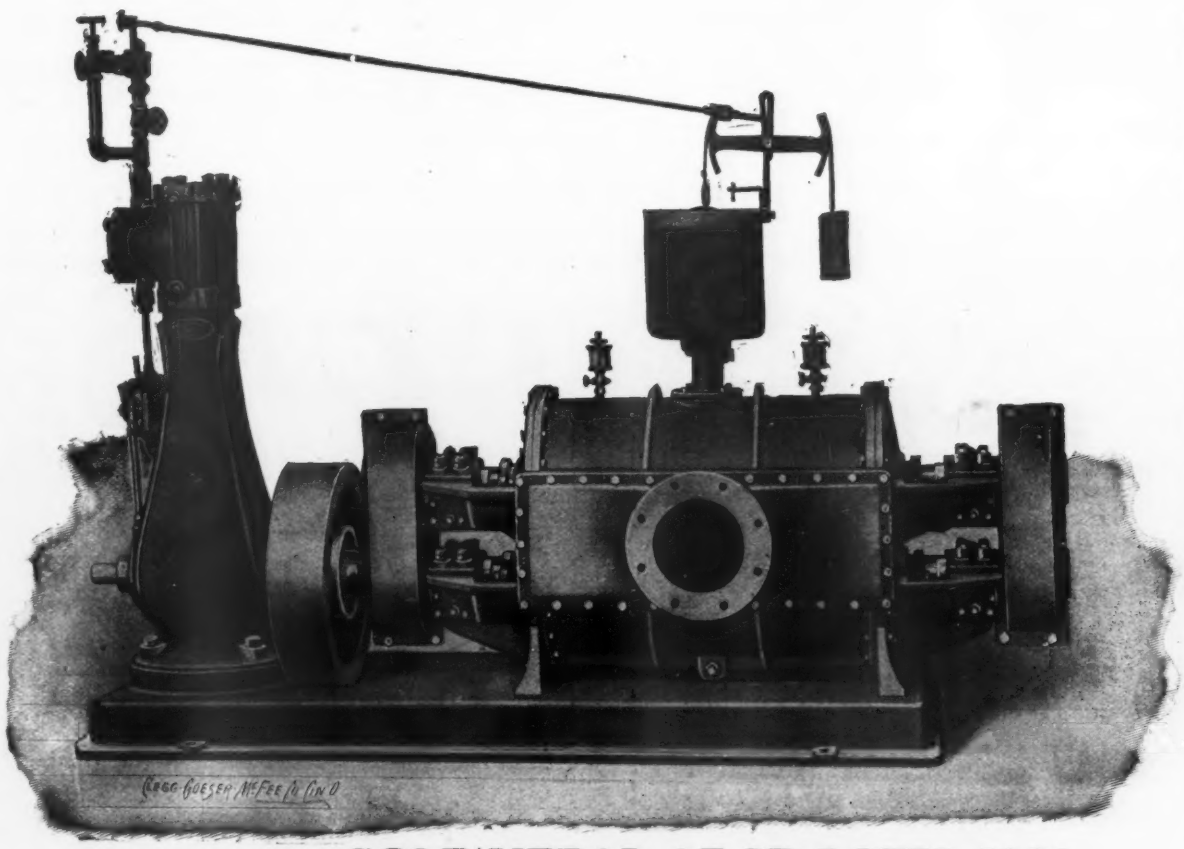

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Sizes for any required capacity.

Self-oiling, adjustable bronze bearings.

Most perfect and sensitive Governor.

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SPECIAL ATTENTION GIVEN TO THE REMODELLING AND EXTENDING OF THE PROPERTIES OF WORKS NOT UP-TO-DATE.

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MANUFACTURERS OF

CAST IRON PIPE AND SPECIAL CASTINGS

FOR WATER AND GAS.

Also, FLANGE PIPE, LAMP POSTS, Etc.

GAS TAPPING MACHINES

—FOR—

Drilling and Tapping Pipe under Pressure

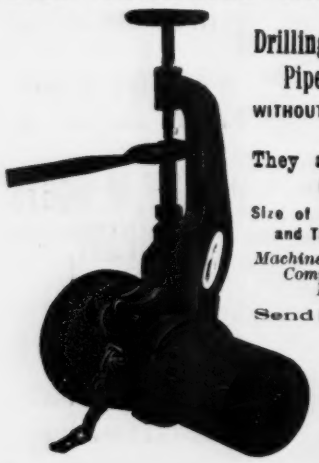
WITHOUT ANY ESCAPE OF GAS.

They are Strong and Compact.

Size of Combination Drills and Taps ¾ to 4-inch.

Machines Sent to any Gas Company for Thirty Days' Trial.

Send for Circulars.



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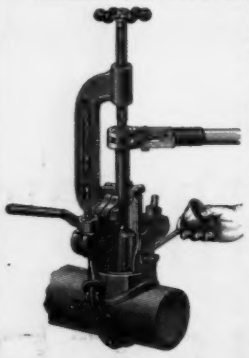
DAYTON, O.

MUELLER GAS MAIN TAPPING MACHINE.



The Mueller "Swivel No. 1," "Swivel No. 2" and "Swivel No. 3" Tapping Machines are made especially for tapping gas mains under pressure. They are made extra heavy in all parts, have extra long ratchet sweep and can be adjusted to any angle or corner of the ditch. The No. 1 taps up to 2-inch, the No. 2 up to 3-inch and the No. 3 up to 4-inch. The "Century Junior" makes taps from ⅛ to ⅓ inch in high pressure mains. Unconditionally guaranteed. Catalogues upon application.

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Globe
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Cheapest and Best
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Plans prepared and Estimates furnished at short notice.

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Established 1856. Works at Phillipsburgh, N. J.

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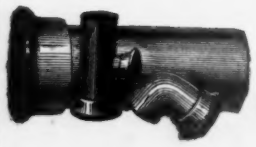

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FROM THREE TO FORTY-EIGHT INCHES DIAMETER. ALSO, ALL SIZES OF

Flange Pipe for Sugar House and Mine Work. Branches, Bends, Retorts, etc., etc.

CHARLES MILLAR & SON CO., Selling Agents, Utica N Y.

Flanged Pipe and Fittings, Hydrants, Gates, Pig Lead, Jute, etc.

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Manufacturers of Lead Pipe, Solder, etc., and Jobbers of Plumbers' and Tinners' Goods.

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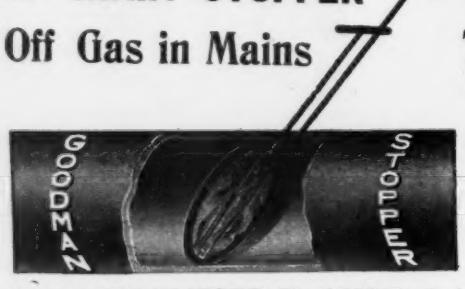
SAFETY GAS MAIN STOPPER COMPANY,

For Shutting Off Gas in Mains

Any size gas main can be shut off in 30 seconds. : : :



Temporarily during alterations and repairs. : : : :

STOPPERS SENT ON TRIAL.

Address: SAFETY GAS MAIN STOPPER CO., 1668 Park Ave., New York City.

This is No. 2.

Height, 36 inches.
Diameter, 12 "
Shipping weight, 80 lbs.
Net weight, 50 lbs.
The products of combustion are entirely separate from the water. Entire water surfaces are tinned.

Price, $35.00.

HOT WATER

FOR BATHROOM AND KITCHEN

is most easily, quickly and economically supplied by a

Humphrey Crescent Instantaneous Water Heater.

Prices range from $20 to $45.
Every Heater GUARANTEED.

Set a heater for every gas consumer. You will please them and increase sale of gas at the same time.

Send to-day for catalogue and discounts to

HUMPHREY CO.,
Kalamazoo, Mich.,

The only manufacturers in the World of a COMPLETE LINE OF INSTANTANEOUS WATER HEATERS.

GEORGE R. ROWLAND,
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Draughtsman and Constructing Engineer.
Drawings, Specifications and Estimates furnished for the construction of new works or alteration of old works. Special attention given to Patent Office drawings.
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J. F. W. JOST,
CHEMICAL ENGINEER
—IN—
GAS MANUFACTURE,
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AMERICAN METER CO.,

NEW YORK, ST. LOUIS, PHILADELPHIA, SAN FRANCISCO, CHICAGO,

Photometrical and Experimental Apparatus.

PUBLIC LIGHTING TABLE.

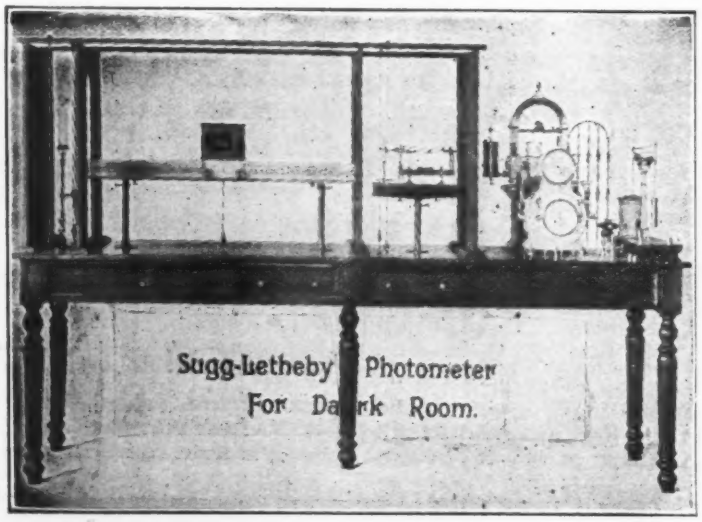
JULY, 1905.

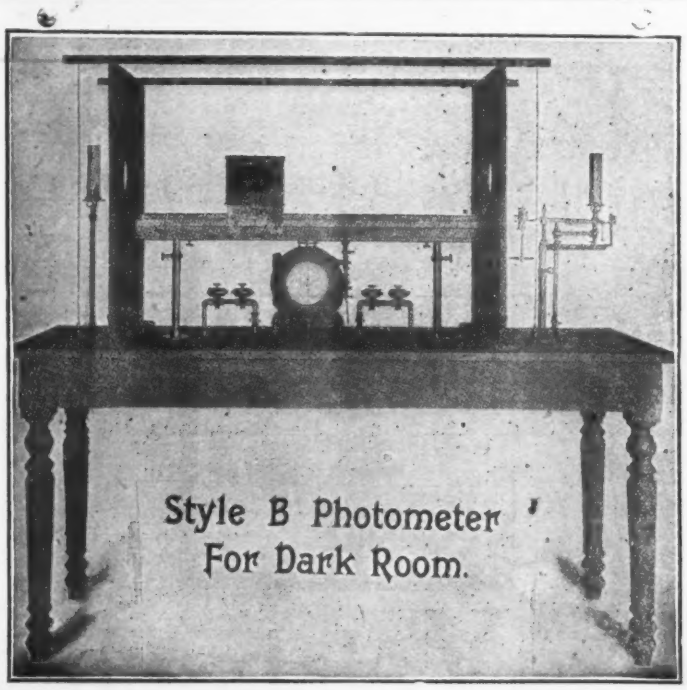
Day of Week.	Date.	Table No. 1. FOLLOWING THE MOON. Light.	Extinguish.
Sat.	1	8.00 PM	3.30 AM
Sun.	2	8.00 NM	3.40
Mon.	3	8.00	3.40
Tue.	4	8.00	3.40
Wed.	5	8.00	3.40
Thu.	6	8 00	3.40
Fri.	7	9.50	3.40
Sat.	8	10.30	3.40
Sun	9	11.00 FQ	3.40
Mon.	10	11.40	3.40
Tue.	11	12.20 AM	3.40
Wed.	12	1.00	3.40
Thu.	13	1.50	3.40
Fri.	14	2.50	3.40
Sat.	15	No L.	No L.
Sun.	16	No L. FM	No L.
Mon.	17	No L.	No L.
Tue.	18	8.00 PM	9.50 PM
Wed.	19	8.00	10.20
Thu.	20	8.00	10.50
Fri.	21	8.00	11.20
Sat.	22	8.00	11.50
Sun.	23	7.50	12.20 AM
Mon.	24	7.50 LQ	12.50
Tue.	25	7.50	1.20
Wed.	26	7.50	2.00
Thu.	27	7.50	2.40
Fri.	28	7.50	3.50
Sat.	29	7.50	3.50
Sun.	30	7.40	4.00
Mon.	31	7.40 NM	4.00

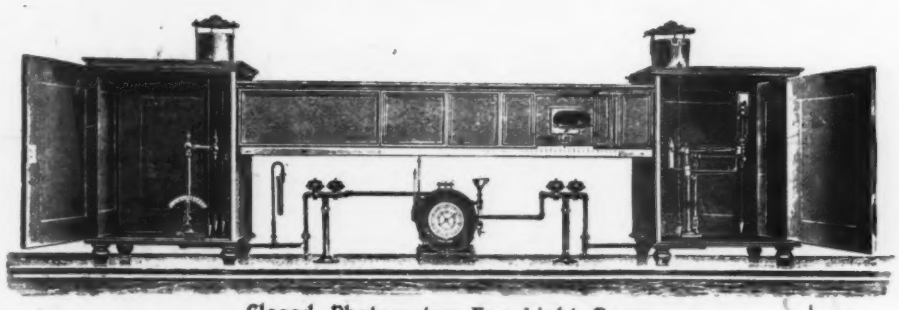
TOTAL HOURS DURING 1905.

By Table No. 1.

	Hrs.Min.
January	240.50
February	192.20
March	207.00
April	175.10
May	161.00
June	139.50
July	149.00
August	161.50
September	173.00
October	205.00
November	211.00
December	229.00
Total, yr.	2245.00







Closed Photometer For Light Room.

CIRCULARS SENT ON REQUEST.

PUBLIC LIGHTING TABLE.

JULY, 1905.

Day of Week.	Date.	Table No. 2. NEW YORK CITY. All Night Lighting. Light	Extinguish.
		P.M.	A.M.
Sat.	1	7.30	3.15
Sun.	2	7.30	3.15
Mon.	3	7.30	3.15
Tue.	4	7.30	3.15
Wed.	5	7.30	3.15
Thu.	6	7.30	3.15
Fri.	7	7.30	3.15
Sat.	8	7.30	3.15
Sun.	9	7.30	3.15
Mon.	10	7.30	3.15
Tue.	11	7.30	3.15
Wed.	12	7.30	3.15
Thu.	13	7.30	3.15
Fri.	14	7.30	3.15
Sat.	15	7.30	3.15
Sun.	16	7.20	3.15
Mon.	17	7.20	3.15
Tue.	18	7.20	3.15
Wed.	19	7.20	3.15
Thu.	20	7.20	3.15
Fri.	21	7.20	3.15
Sat.	22	7.20	3.15
Sun.	23	7.20	3.15
Mon.	24	7.20	3.15
Tue.	25	7.20	3.15
Wed.	26	7.20	3.15
Thu.	27	7.20	3.15
Fri.	28	7.20	3.15
Sat.	29	7.20	3.15
Sun.	30	7.10	3.30
Mon.	31	7.10	3.30

TOTAL HOURS DURING 1905.

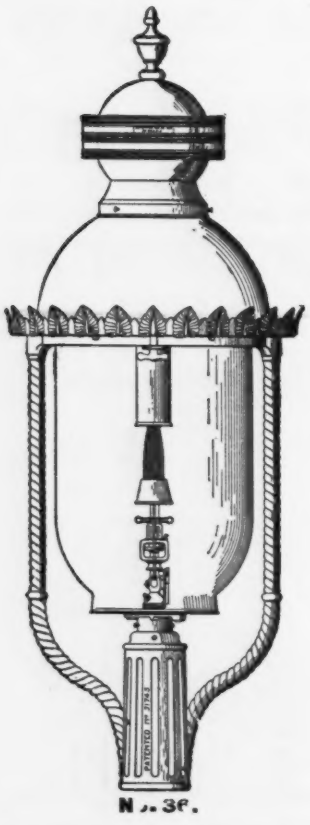
By Table No. 2.

	Hrs.Min.
January	423.20
February	355.25
March	355.35
April	298.50
May	264.50
June	234.25
July	243.45
August	280.25
September	321.15
October	374.30
November	401.40
December	433.45
Total, yr.	3987.45

NEW YORK, 97 Liberty Street. BOSTON, 814 Beacon Building. PHILADELPHIA, Broad and Arch Streets. ST. LOUIS, 712 Roe Building. CHICAGO, Foot of Orleans Street. SAN FRANCISCO, 712 Polk Street.

WELSBACH STREET LIGHTING COMPANY

.... OF AMERICA ....



No. 38.

Controls and Operates the

Welsbach System of Street Lighting,

Which includes its specially DESIGNED AND PATENTED BURNER for STREET and PARK LIGHTING exclusively.

Uniformly SUCCESSFUL in 150 Cities and Towns.

By means of the Welsbach System of street lighting the superiority of GAS over electricity for street lighting has been fully demonstrated.

POINTS OF MERIT:

It is { Economical, Attractive, Successful, Up-to-date.

IT LIGHTS THE STREET.

Where there are no gas mains we can furnish an equally good light by our SELF-GENERATING NAPHTHA WELSBACH BURNER, and thereby supply a uniform light in all localities.

Correspondence Solicited from Gas Companies and Others interested in Municipal and Outside Lighting.

No. 38.

AN underlying principle in business is to show an increase each year---to grow. The astute dealer not only seeks to retain this year's customers, but to attract new trade next year.

The formula is simple---

THIS SHIELD IS THE WELSBACH TRADE MARK.

IT IS A GUARANTEE AND A PROTECTION.

Sell The Welsbach Brands.

The imitation stuff is bad for the customer---which is bad for you.

The genuine Welsbachs---Burners or Mantles---make satisfied customers---keep customers---MAKE NEW ONES.

And your profit isn't merely dollars and cents.

WELSBACH CO.,

Broad and Arch Sts., PHILADELPHIA.

THE UNITED GAS IMPROVEMENT COMPANY

For the Year Ending December 31st, 1904, has been Awarded Contracts for 45 Sets of

Standard Double-Superheater Lowe Water Gas Apparatus.

PARTIAL LIST OF PLACES:

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Pelham, N. Y.
Reading, Pa.
Augusta, Me.
Bangor, Pa.
Woonsocket, R. I. (2d contract).
Brooklyn, N. Y. (4th contract).
Cincinnati, O. (2d contract).
Scranton, Pa. (3d contract).
New York City (14th contract).
New Haven, Conn. (2d contract).
Watertown, N. Y.
Tampa, Fla. (3d contract).
Westchester, N. Y. (3d contract).
Bridgeport, Conn. (2d contract.)
St. Paul, Minn. (2d contract).
Springfield, Mass. (2d contract).
Lynn, Mass. (5th contract).
Rochester, N. Y.
Battle Creek, Mich.
Mechanicsburg, Pa.
Excelsior Springs, Mo.
Bristol, Conn.
Jersey Shore, Pa.
Vicksburg, Miss.

TOTAL SETS, 1904, ... 45
TOTAL DAILY CAPACITY, 1904, ... 56,325,000 cubic feet.
TOTAL SETS TO DATE, ... 553
TOTAL DAILY CAPACITY, ... 419,180,000 cubic feet.

The United Gas Improvement Company,

Broad and Arch Streets, Philadelphia.

Established 1858. Incorporated 1890.
CHAS. E. GREGORY, Prest. DAVID R. DALY, V.-Prest. & Treas.
H. D. ABERNETHY, Sec.

J. H. Gautier & Co.

Greene & Essex Streets,
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Ground Fire Clay, Fire Sand and Ground Fire Brick in Barrels and Bulk.

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Brooklyn Fire Brick Works,

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NATIONAL PYROGRANIT COMPANY,

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Fire Brick, Tiles, Special Shapes, etc.

NEW YORK OFFICE:
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WORKS:
South River, N. J.

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Consulting Engineer

AND

CONTRACTOR,

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Established 1846.

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Manhattan Fire Brick and Enameled Clay Retort Works.

Works at Weber, on the Raritan River, Middlesex County, N. J.

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Modern Coal Gas Plants,

With either Horizontal or Inclined Retorts, Half-Depth and Full-Depth Recuperative Furnaces, Adam Weber Patents.

MODERN BENCH IRONWORK.

Linings for Water Gas Apparatus, High Grade Fire Brick of All Descriptions, Ground Fire Clay, Ground Fire Brick in Bulk or Barrels.

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Works, LOCKPORT STATION, PA.

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PETER YOUNG, Secretary and Treas.
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Fire Clay Goods for Gas Works.

HENRY MAURER & SON,

(ESTABLISHED 1856.)

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RETORT WORKS

WORKS, Perth Amboy, N. J.
OFFICE, 418 to 422 East 23d St., N. Y.

Clay Gas Retorts,

BENCH SETTINGS,

Fire Brick, Tiles, Etc.

GEROULD'S IMPROVED RETORT CEMENT

A Cement of great value for patching retorts, putting on mouthpieces, making up all bench-work joints, lining blast furnaces and cupolas. This cement is mixed ready for use. Economic and thorough in its work. Fully warranted to stick.

Price List, f.o.b. BLOOMINGTON, INDIANA.
In Casks, 400 to 800 pounds, at 5 cents per pound.
In Kegs, 100 to 200 " " 6 " "
In Kegs less than 100 " " 7 " "

C. L. GEROULD, BLOOMINGTON, IND.

For orders East of Buffalo, N. Y., or Pittsburg, Pa., freight will be paid to these points.

THE ECONOMICAL GAS APPARATUS CONSTRUCTION COMPANY, LIMITED,

Consulting Engineers.

Builders of UP-TO-DATE Machinery and Appliances for Coal and Water Gas Plants. :: :: :: :: ::

PLANS,
SPECIFICATIONS
AND ESTIMATES
PREPARED.

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BALTIMORE RETORT & FIRE BRICK CO.

MANUFACTORY AT
LOCUST POINT, BALTIMORE, MD.

Clay Retorts, Blocks & Tiles

FIRE BRICK, FIRE CLAY, AND FIRE CEMENT.

Our Improved Half and Full Depth Benches have been Adopted by Many Gas Companies.

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Sole Agents for New England States.

JOHN DELL,
President and General Manager.

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ESTABLISHED 1882.

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We are the **Exclusive Agents** *for the* **Mitchell Patent Benches,** *Constructed with Half or Full Depth Furnaces, to Burn either Coal or Coke, and Arranged for Front or* **Rear Clinkering.** **The Mitchell** *is the* **Original Coal Firing Bench.** *We also Erect Plain Benches with* **One** *to* **Six Retorts.**

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ST. LOUIS, MO.

Bronder Patent Stoking Machinery.

Three-Scoop and Three-Rake Charging and Discharging Machines are operating in New York, Newark, N. J., Philadelphia, Worcester, Mass., Mt. Vernon, N. Y., Toronto and Montreal, Canada.

Four-Scoop and Four-Rake Charging and Discharging Machines are operating in Detroit, Mich.

These are the only machines that will draw or charge simultaneously 3 or 4 retorts (vertically) and handle from 42 to 60 retorts in from 25 to 30 minutes, lid opening and closing and filling of furnaces included.

Hot Coke Conveyor, Quencher and Steam Exhauster, operating in Toronto, Canada, working in water-sealed flue, rollers being protected from heat and grit.

COAL CRUSHERS, CONVEYORS AND BINS. TURNTABLES FOR MACHINES.

Labor-Saving Machines for Handling Coal and Coke from Coal Cars to Coke Yard or Bins, a Specialty.

G. A. BRONDER,

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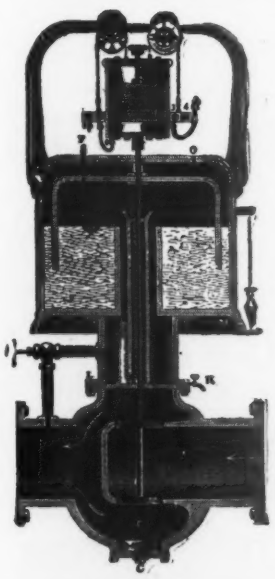

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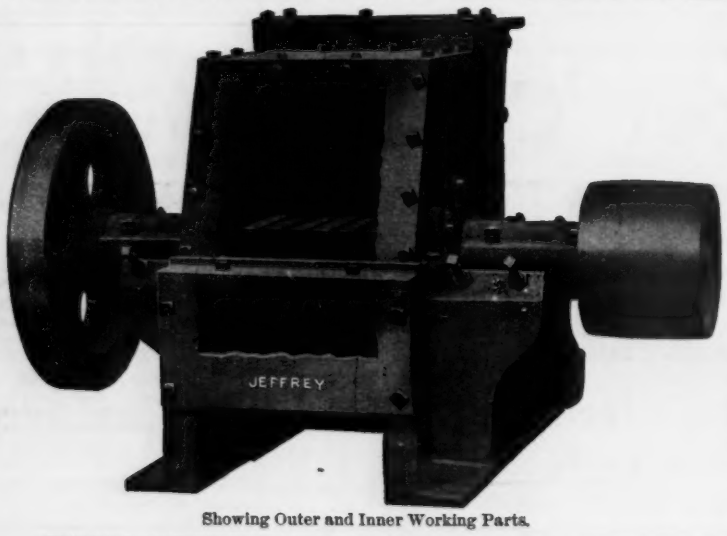

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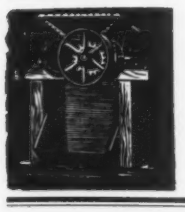

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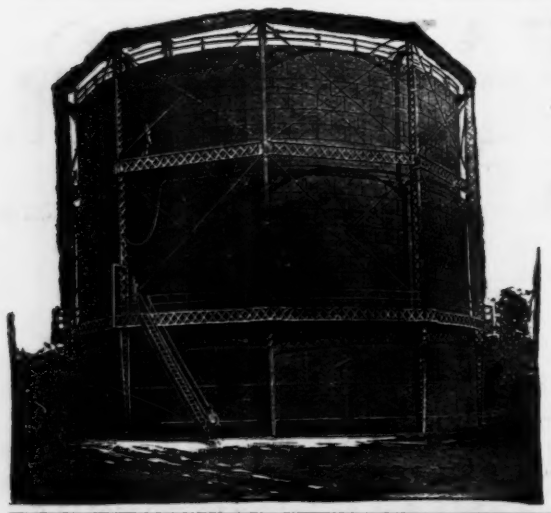

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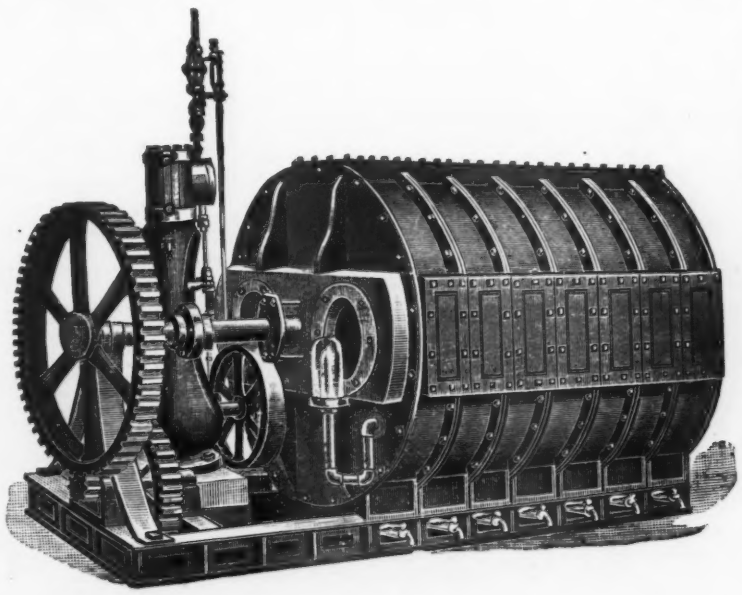

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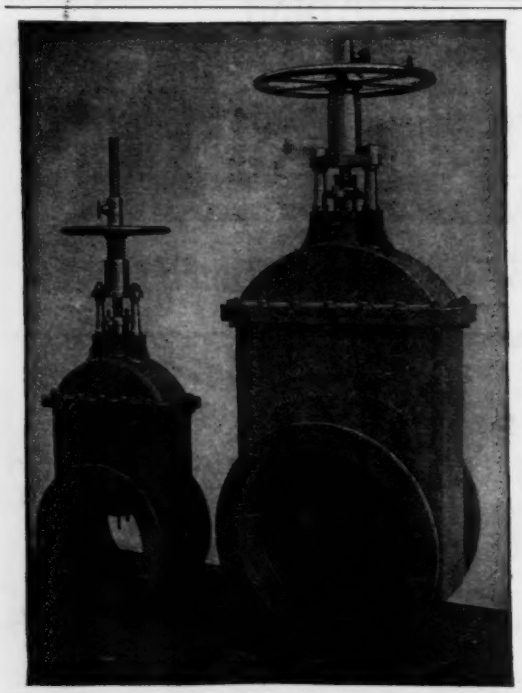

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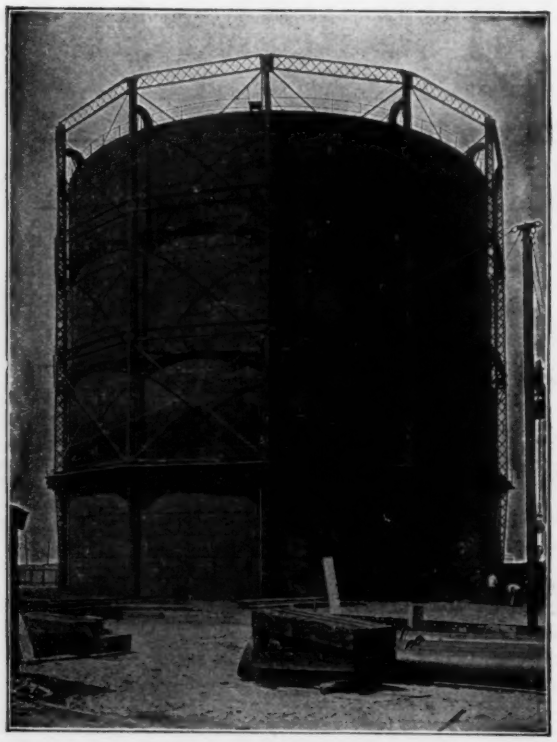

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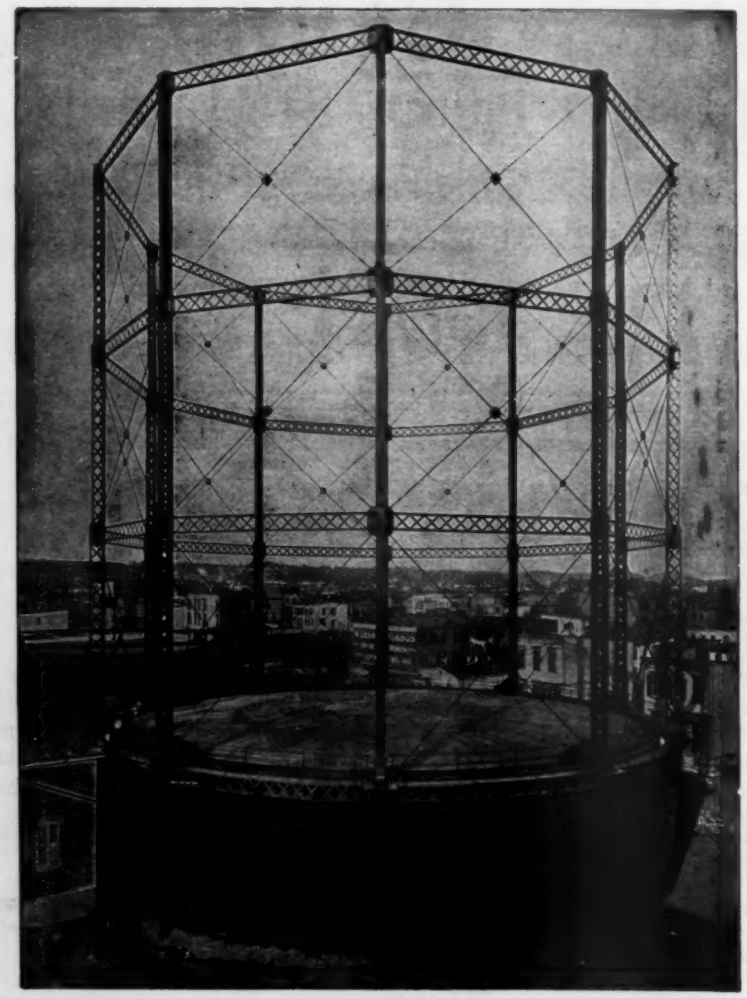

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